

**Model Municipal By-law  
For Regulating  
Woodburning Appliances**

**SUPPORTING DOCUMENT**

## Introduction

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In 2000, the Canadian Council of Ministers of the Environment developed a Canada-wide Standard for particulate matter less than or equal to 2.5 microns (also known as fine particulate or PM<sub>2.5</sub>) as a result of the pollutant's adverse effect on human health.

Woodburning generates smoke, which contains fine particulates. These fine particulates can remain in the air for days and have the potential to penetrate deep into the lungs if inhaled. The effects of fine particulates vary from irritation of the eyes and respiratory tract, to more serious disorders, including asthma, bronchitis, reduced lung function and early mortality. Children, the elderly and people with lung disease tend to be the most vulnerable. Wood smoke also contains a number of organic carbon compounds, such as volatiles organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), which are also potentially harmful to human health.

In certain areas, most notably where there is a dense concentration of wood burners and/or topographical or adverse weather conditions, a high concentration of fine particulates can result and may indicate that wood burning is not conducive to that area. In some cases, those conditions are only temporary; in other situations they are chronic and may require a controlled or more regulated approach to wood burning.

This document is intended to support the model municipal by-law for regulating woodburning appliances where air quality problems due to residential wood burning are experienced or where municipalities desire to avoid air quality problems.

The workshop summary of the Kelowna "*Residential Indoor Wood Burning Bylaw Workshop*" (2002) served as a starting point for developing the by-law. In addition, a total of 26 Canadian and American jurisdictions were invited to respond to specific questions assessing the implementation and performance of their own by-laws, of which 17 replied.

Each section of the model by-law addresses control strategies or options for control strategies to address particulate matter emissions and concentrations. The control strategies can be categorized as:

- (1) Programs that specify limits on total emissions, measured either as a unit of production or as a reduction in emissions relative to a baseline. These include emission limits for woodburning appliances and mandatory curtailment programs.
- (2) Programs that provide incentives or impose disincentives to limit emissions rather than to mandate reductions. These include financial assistance programs to encourage change out of non-certified woodburning appliances and mitigation offset programs.
- (3) Programs that do not yield quantifiable emission reductions, but still contribute to an area's overall attainment with air quality standards. These include public education and information programs.

These strategies comprehensively address particulate matter pollution by establishing regulatory mechanisms, offering financial incentives and assistance and providing education and information. The recommended control strategies for municipalities utilize a mix of all three strategies.

This document provides supporting information for the following model municipal by-law control strategies:

- (1) Fuels
- (2) Installation of Wood Burning Appliances;
- (3) Non-certified Appliance Removal;
- (4) No Burn Days;

- (5) Nuisance;
- (6) Opacity and
- (7) Outdoor Solid-fuel Combustion Appliances.

Supporting information is also provided on the following control strategies that are not part of the municipal by-law:

- (8) Emission Offsets and
- (9) Awareness, Education and Communication.

For each control strategy, information is provided on:

**Description:** A narrative of the strategy describing what and how the strategy be accomplished.

**Target:** The particulate matter sources, type of development and emission goals that the strategy is intended to address.

**Advantages:** Various factors that support the strategy.

**Disadvantages:** Various factors that weigh against the strategy.

**Costs to Private Citizens:** The potential costs of the strategy that will be directly passed onto the private citizen to implement the strategy.

**Costs to Public Sector:** The potential costs to the municipal government and other public agencies to implement the strategy. These costs may be considered indirect costs to the citizens.

**Emissions Savings:** Reductions from current levels of emissions and emission concentrations anticipated upon implementation of the strategy.

**Enforcement:** A discussion on how the strategy will be enforced to ensure compliance.

**Implementation Guidelines:** Guidelines on how the strategy should be effectively implemented. This section often refers to the need for an education component. Examples of educational materials include:

- (1) Test the moisture content of wood
- (2) Burn Hot, Burn Clean educational video
- (3) The Wood Burning Handbook
- (4) A Guide to Residential Wood Heating

A contact list of certified wood stove and fireplace installers

**Who is doing it?:** A non-inclusive list of Canadian and United States jurisdictions that have this kind of strategy.

**Notes:** Remarks or comments from jurisdictions that apply the strategy.

# 1. Fuels

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**Description:** The moisture of wood in part dictates the amount of particulate emissions that will be generated by the burning of wood. Green wood emits more particulate matter than seasoned wood because the moisture interferes with efficient combustion. Only wood seasoned for at least 6 months should be burned in a woodburning appliance or fireplace.

Other types of fuels, when burned, are recognised sources of toxics such as dioxins, furans and polycyclic aromatic hydrocarbons.

Therefore, the following fuels should be prohibited in a woodburning appliance: wet or unseasoned wood, garbage, treated wood, plastic products, rubber products, waste petroleum products paints, paint solvents, coal, glossy coloured papers, particle board and salt driftwood.

**Targets:** This strategy is targeted toward the reduction of fine particulate emissions and other toxic pollutants at all times.

**Advantages:**

- (1) This by-law would encourage people to store their wood and let it dry for several months before use. Ultimately, it would help to prevent people from burning green wood and other inappropriate fuels. It would also help curtail emissions of toxic substances and obnoxious odours.
- (2) Even when old appliances are being used, they will emit less if they are only burning clean seasoned wood.

**Disadvantages:**

- (1) To be effective, this by-law will require public education to make the public aware of the measure and enforcement for proper implementation.

**Costs to Private Citizens:** There should be no cost to private citizens unless they pay extra for seasoned wood.

**Costs to Public Sector:** The municipality will need to support an education component and enforcement staff, including the cost of a moisture meter.

**Emissions Savings:** Emission savings will vary from place to place and cannot be predicted.

**Enforcement:** This by-law can be enforced through complaint and/or planned patrol. There should be a clean-burning education component included.

**Implementation Guidelines:**

- (1) A communication strategy to inform residents of this by-law should be included
- (2) A two-step enforcement policy should be used to enforce this by-law:
  - First offence should be dealt with by issuing a warning ticket and by suggesting tips on how to alleviate the problem, including, for example, the offer of educational materials.
  - Second offence should be dealt with by issuing a ticket. The By-law Officer will also converse with the accused a second time to offer tips on how to alleviate the problem.

**Who is doing it?:** Central Okanagan, BC; Truckee, NV; Puget Sound Clean Air Agency; Spokane, WA; Shasta, CA; Santa Rosa, CA; San Jose, CA; Rapid City, SD; Los Gatos, CA;

Petaluma, CA; Palo Alto, CA; Morgan Hill, CA; Contra Costa county, CA; San Mateo county, CA; Feather River, CA; Jackson County, CO; Montreal, QC; Vancouver, BC; Prince George, BC

**Notes:**

**Canada**

<b>Jurisdiction</b>	<b>Enforcement</b>	<b>Communication</b>	<b>Penalties</b>
Prince George, BC	Patrol and resident complaints. The only costs are mostly advertising costs. Education is crucial to ensure that misinformation is not spread about the reasons of the by-law.	Advertising on the radio, TV and newspapers and the Burn it Smart workshops.	1 <sup>st</sup> offence is a warning; 2 <sup>nd</sup> offence resident goes to court and ticketed with a \$50 to \$100 fine.
North Saanich, BC	By complaints only. The measure is not really costly since firefighters who make the check are already employed by the city.	There is a pamphlet at the Municipal Hall that is distributed upon request.	There is a system of warning tickets and fines. Fines range from \$30 to \$200 depending of the gravity of the offence. A couple of people were given tickets. Most of the time warning works.
Greater Vancouver Regional District, BC	The powers of inspection in private residences are very limited. The authorities are only able to inspect within a private residence if the owner agrees to let them in. Most of the activities in the area are conducted by letter or over the phone.  The costs are hard to estimate. The dollar costs are quite low, as not a large number of complaints are received and those that are received are mostly handled by phone and letter.  Education is much more cost effective than enforcement is most situations.	There are brochures that detail acceptable fuels for woodstoves and fireplaces, which we mail out to homes where it is suspected a woodburning appliance is not being operated properly.  Informing the problem woodburner that their activity is having a detrimental effect on others is often enough to prompt a change in wood burning behaviour.	The by-law has never been tested in court, so it is unsure whether a prosecution under this section would result in a conviction. Section 12 specifies that maximum penalties upon conviction (\$5000 fine and/or six months in jail). A judge would determine actual penalties.

**USA**

<b>Jurisdiction</b>	<b>Enforcement</b>	<b>Communication</b>	<b>Penalties</b>
Santa Rosa, CA	The small availability of certain fuels in the region has an effect that nobody has ever violated the by-law.	n/a	n/a

<b>Jurisdiction</b>	<b>Enforcement</b>	<b>Communication</b>	<b>Penalties</b>
Spokane County, WA	Field staff perform surveillance of excess opacity emissions and respond to complaints of excess smoke emissions, issuing verbal or written warnings or taking formal enforcement action at the time of documenting an opacity violation.	Education is conducted through outreach and enforcement activities – having brochures at wood stove retailers, libraries, city halls; hand outs and verbal information provided by staff in the field; warning letters; advertising in phone book; info on website, etc.  Educational outreach about the program raised awareness of the issue, which increased the number of complaints received about burning prohibited materials, which resulted in further educational outreach, which achieved greater compliance.	\$150 for any violation and from \$50 to \$250 additive penalties depending of the gravity of the offence.
Rapid City, SD	Enforcement is operated on a complaint basis and there is an investigation when authorities feel there is a violation.  Costs are not calculated since only two or three complaints are received each year.  The City’s regulations were adopted because of occasional daily violations of the PM10 standard. The monitoring data has indicated that there is no wood smoke issue; Rapid City’s violations stemmed from naturally dusty conditions due to the arid climate and occasional high wind events.	It is included in the City code and Public Service Announcements are sent and aired in the media and appear in the local paper.	Authorities have never had to issue a notice of violation as compliance has been obtained in the few instances where complaints were received.
Petaluma, CA	The ordinance does not cover any verification of compliance.	Through the issuing of building permits.	The ordinance does not cover any penalties.

## 2. Installation of Woodburning Appliances

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### Option a) All Installations

#### **Option a.1) Certified appliances with exceptions**

#### **Option a.2) Certified appliances only**

**Description:** This by-law would prohibit the installation of woodburning appliances that do not meet the Canadian CSA standard and/or the US EPA standard. In this case "Canadian CSA standard" means the Performance Testing of Solid-Fuel-Burning Heating Appliances CAN/CSA-B415.1 standard published by the Canadian Standards Association as amended from time to time and "US EPA standard" means the New Source Performance Standards, Title 40, Part 60, Sub-part AAA of the Code of Federal Regulations (USA), published by the United States Environmental Protection Agency as amended from time to time. In addition, the owner shall obtain a permit prior to the installation of an appliance.

**Option a.1)** offers the following exceptions: a site-built masonry fireplace, a site-built masonry heater, a site-built decorative fireplace, a fireplace with a minimum burn rate above 5.0 kg/h or a cookstove

**Option a.2)** would apply to all appliances with no exceptions.

**Targets:** This by-law places a limit on PM<sub>2.5</sub> emissions generated from woodburning appliances. In the long term, the effect of this by-law will be to reduce particulate emissions, by preventing installation or re-installation of high polluting appliances.

#### **Advantages:**

- (1) Easy to enforce as it can be tracked through permits (often building permits).
- (2) Encourages the sale, and thus the manufacture of more advanced technology stoves.
- (3) Engages the hearth product industry.

#### **Disadvantages:**

- (1) Old appliances last a long time so turnover to new stock is slow.
- (2) Old appliances could still be in use either through second-hand sales or by their original owner in another building (e.g., garage, cottage).
- (3) Could be hard to track if the owner does not ask for a permit.
- (4) Homeowners will be prevented from having free burning fireplaces (option a.2).

**Costs to Private Citizens:** Costs can be measured in additional cost for a certified appliance, equipment and installation versus a conventional appliance as well as permit fees.

**Costs to Public Sector:** Public costs to implement and enforce these regulations are recovered through building permit and inspection fees.

**Emission Savings:** No emissions savings were evaluated. In the long term we should see benefits as old non-certified appliances will disappear.

**Enforcement:** The regulations could be implemented by ordinance in the municipal building code. The building division could verify compliance with the regulations at the building permit review and building inspection stages. Violations could be enforced by the building inspector and code enforcement officer through the enforcement provisions of the municipal building code.

**Implementation Guidelines:** A communication strategy to inform residents of this by-law should be included as well as an education package.

**Who is doing it? :** Central Okanagan, BC; Washington State; Santa Rosa, CA; State of Oregon; Whitehorse, YT; Comox, BC; Boulder, CO; Feather River, CA; Jackson County, OR; Larimer County, CO; Fort Collins, CO; Berkeley, CA; Crested Butte, CO; Livermore, CA; Central Okanagan; Juneau, AS; Truckee, NV; Spokane, WA; Shasta County, CA; Santa Rosa, CA; San Jose, CA; Rapid City, SD; Los Gatos, CA; Petaluma, CA; Palo Alto, CA; Morgan Hill, CA; Contra Costa county, CA; San Mateo county, CA; Berkely, CA; Prince George, BC.

**Notes:**

**Canada**

Jurisdiction	Requirements	Enforcement	Penalties
Prince George, BC	Canadian Standard or US EPA standards for emissions	Residents must apply for a permit to receive an inspection that determines that the stove is CSA/EPA approved for emissions. Either the installer or the property owner applies for it at City Hall. There is a \$70 cost, which includes the inspection. Insurance companies need this approval for insuring homes. The resident pays for the inspection.  Most communication is done through phone calls and visits by residents to City Hall.	It is illegal to install a woodburning appliance without a permit. Enforcement Officers have right of entry under the by-law. If a stove is installed without approval, the resident can be asked to remove the stove and their insurance is null and void if there is a fire. <sup>1</sup>

<sup>1</sup> An agent from a local insurance company mentioned that they are mostly concerned about installation. They don't really ask about the emissions. If the installation has not been inspected and installed by a qualified inspector, and there is a fire, insurance will be void or surcharged. Applicants have to fill a wood heat questionnaire, about the installation and safety.

Jurisdiction	Requirements	Enforcement	Penalties
Quesnel, BC	EPA emission certification.	<p>The enforcement is made in conjunction with the provincial regulation, which restricts the manufacture and sale of non-certified stoves. The property owner or agent is required to obtain a building permit for the installation and the inspection comes with that permit.</p> <p>The offenders are discovered from complaints, competing contractor or if the work is seen proceeding.</p> <p>Staff time and legal fees might add up to \$2000 or more, with no assurance of success.</p>	<p>The authorities have the ability to pursue a fine through the local municipal courts.</p> <p>In this small community, the neighbours generally advise the authorities of what they don't see. The contractors find it's easier to comply than to fight City Hall.</p>
Whitehorse, YK.	Canadian Standard or US EPA standard for emissions.	<p>The building inspection department has a list of certified wood stoves. The owner wishing to install a stove must make sure that their stove is on the list and provide the department with the make and model number. The department also worked with all the suppliers of wood stoves to make sure that they were recommending stoves for installation in Whitehorse that met the code. The installation of a wood stove requires a permit, which is finalized after the wood stove is installed.</p> <p>Inspections are done for new stove installations at the expense of the homeowner.</p> <p>The department worked with stores to educate the sellers of the new requirements. Newspaper ads were on the City page, and in the classified section, where old stoves are likely to be re-sold to unwary buyers.</p>	None. You can't get a permit for a non-approved stove.

<b>Jurisdiction</b>	<b>Requirements</b>	<b>Enforcement</b>	<b>Penalties</b>
Greater Vancouver Regional District, BC	Requirements of the Wood Burning Domestic Appliance Regulations, issued by the province of BC under the Waste Management Act.	Inspections are only attempted if there are multiple complaints and phone calls and letters have been ineffective in resolving problems. With regards to domestic fireplaces and wood stoves, we have focused our efforts on ensuring good fuel quality and appropriate operating procedures. There was no issue taken with the design of the stove other than to ensure that it has been well installed.	If the unit exceeding emissions criteria is in a private residence, education is our primary tool in gaining compliance. If deficiencies are found, corrective action is required, usually by letter. This by-law has not been tested in court; any penalties to be assessed would be at the discretion of a judge (assuming a conviction can be obtained).
Comox, BC	By-law enforcement is complaint-driven.	New construction owners generally declare and inspect their woodburning appliances. When an inspection is required, the homeowner has to pay \$50.	None at this time.

### USA

<b>Jurisdiction</b>	<b>Requirements</b>	<b>Enforcement</b>	<b>Penalties</b>
Shasta, CO	Appliances have to be town-approved.	<p>Compliance is not verified for old construction. Authorities keep an eye on the paper signed by retailers. Occasionally, some homeowners could be called to have their appliances verified but it has not been done in many years.</p> <p>Planning and building sectors are aware of the rules for new construction. They take care of the compliance for new construction.</p> <p>New woodstove owners pay \$10 for a permit that goes to the building sector, but basically the measure does not cost anything.</p> <p>People are aware of the measure; they know it and they generally comply.</p>	<p>One woodstove store has already been told to stop selling non-certified appliances.</p> <p>Penalties have not been issued. Fines range from \$250 for a first offence and up to \$1000 for further offences.</p>
Santa Rosa, CA	Appliances have to be town-approved.	<p>Every new homeowner has to have his house inspected when he decides to install a woodburning appliance. That is how the city can be sure that appliances are inspected and that homeowners know about the measure.</p> <p>Costs of the building permits cover the costs of the implementation of the by-law.</p>	n/a

Jurisdiction	Requirements	Enforcement	Penalties
Petaluma, CA	<p>Appliances have to be town-approved (series of requirements)</p> <p>It is still recommended but not required to remove a non-certified wood heater upon sale of property.</p>	<p>Through the plan check and inspection process, associated with a building permit. The applicant pays for the inspection.</p>	<p>If there are non approved appliances, they would be required to be removed.</p>
Crested Butte, CO	<p>Appliances have to be certified.</p>	<p>In 1989, the authorities wanted all non-certified wood stoves removed. Everyone had to comply. In 1995, authorities inspected every stove, and kept a record of whether the wood stoves were replaced or moved. After this date, it became the homeowner's responsibility to maintain their wood stove. If they replace it, must be certified.</p> <p>When an inspection occurs, the owner pays for it. The maintenance inspection is not mandatory, but all new installations must be inspected.</p> <p>Because it is a small community, the two inspectors go in town everyday and can easily discover non compliance.</p> <p>The measure was installed because there was an air quality problem of both PM and carbon monoxide and everybody complied. There was a 100% improvement.</p>	<p>If it is obvious that a lot of smoke is coming out of a chimney, inspectors go and check what kind of appliance is in the house. If it's not certified, the installation would be red tagged and the owner would be forced to replace it by an approved appliance.</p> <p>If an owner is asked to remove his appliance, it could go to district court. The judge would issue the penalty. Nobody has ever been fined, but the maximum could be \$1000 per day.</p>

Jurisdiction	Requirements	Enforcement	Penalties
Livermore, CA	Phase II emissions for wood stoves established by EPA standards.	<p>EPA certified appliances would need to have a label affixed to the appliance or some other proof. Most new housing in the area are installing decorative gas fireplaces and the EPA rules don't apply to alterations, remodels, room additions and masonry fireplaces.</p> <p>A loophole in the law allows the installation of non-EPA certified appliances and fireplaces after the new house has been given final approval for occupancy. At that point the house is considered existing and the installation of the woodburning stove or fireplace would be an alteration, of which, a permit is still required but this wouldn't be new construction.</p> <p>The cost for the inspection is included in the fee collected for the construction permit. The developer, contractor or the homeowner pays for it. Eventually, the cost is passed on the buyer.</p>	The city can only discover the offenders through inspections performed for new construction. The penalties would be the removal of non-certified appliances. Work is stopped if compliance is not obtained.

## **Option b) New Construction**

### **Option b.1) Alternate form of space heating (no exceptions)**

### **Option b.2) Alternate form of space heating with exceptions**

**Description:** For all new construction, the structure shall contain an alternate form of space heating, including natural gas, propane, electric, oil, solar or kerosene, sufficient to meet necessary space heating requirements, so that during episodes of high pollution levels, the occupant will be able to heat the home other than with a woodburning appliance. (See section 4 discussing “No Burn Days”)

Option b.1) has no exceptions to the rule. Option b.2) offers the following exceptions: central systems able to demonstrate very low emissions (e.g., < 20 % of the CSA B415.1 limit) are exempted. This will prevent extremely onerous investment for those people installing very high performing biomass systems, (e.g. chip-fired central systems) as they are faced with the cost of two heating systems. This also would have the advantage of offering manufacturers some incentive to develop ultra-clean units. These units have been offered in the past and are likely to be again if the cost of conventional heating fuels continues to rise (their high initial cost was a major factor in low consumer acceptance).

**Targets:** This control strategy targets PM<sub>2.5</sub> emissions generated from a residence. The strategy’s goal is to limit emissions from a residence during poor air quality episodes.

**Advantages:**

- (1) Easy to enforce as it can be tracked through permits (often through building permits).
- (2) Reduce future air quality concerns.

**Disadvantages:** It does not address current problem caused by old appliances.

**Costs to Private Citizens:** There is no cost to private citizens.

**Costs to Public Sector:** There is a communication cost.

**Emission Savings:** No emissions savings were evaluated.

**Enforcement:** The regulations could be implemented by ordinance in the municipal building code. The building division could verify compliance with the regulations at the building permit review and building inspection stages.

**Implementation Guidelines:** A communication strategy to inform residents of this by-law should be included.

**Who is doing it? :** Truckee, NV; Jackson County, OR.

**Notes:**

**USA**

<b>Jurisdiction</b>	<b>Requirements</b>	<b>Enforcement</b>	<b>Penalties</b>
Jackson County, OR	Certified appliances and that the house contains an alternate form of heating.	<p>A few years ago, there was a program to remove all non-certified wood stoves and install new systems of heating or certified appliances. There is also a natural gas company, very aggressive (in their approach) to install appliances, and tax rebates are given to people who use it. The education program is the most efficient.</p> <p>Building departments of the cities have incorporated the by-law in their standards of construction, so they can check. The homeowner pays for the permit; the inspection is part of that. Permit is substantially related to the value of the house.</p> <p>To discover an offender, there would have to be a complaint. Before, they could be discovered during a high pollution period.</p>	A citation to court would be issued, but it has never happened.

### **Option c) Total Ban**

**Description:** No person shall install a woodburning appliance in any residential or commercial construction.

**Targets:** This control strategy targets new PM<sub>2.5</sub> emissions. This by-law puts a cap on the total number of appliances allowed within a community.

**Advantages:**

- (1) Easy to enforce as it can be tracked through building permits.
- (2) Could be applied by insurance companies.
- (3) Reduces future air quality concerns.

**Disadvantages:** It does not address current problem caused by old appliances.

**Costs to Private Citizens:** There are no costs to private citizens.

**Costs to Public Sector:** There is a communication cost.

**Emission Savings:** No emissions savings were evaluated.

**Enforcement:** The regulations could be implemented by ordinance in the municipal building code. The building division could verify compliance with the regulations at the building permit review and building inspection stages.

**Implementation Guidelines:** A communication strategy to inform residents of this by-law should be included.

**Who is doing it?:** The State of Connecticut has passed a bill that prohibits installation of outdoor woodburning furnaces.

**Notes:** N/A

### 3. Non-certified Appliance Removal

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#### Option a) Removal Program (Change-out)

**Description:** The local authority would establish a removal program for non-certified woodburning appliances that may incorporate incentives for energy conservation and air quality improvement including, but not limited to, household insulation, insulating products, non-certified wood stove replacement and substitution of heating methods and appliances including certified woodburning appliances.

**Targets:** This strategy addresses PM<sub>2.5</sub> emissions generated by the burning of wood in woodburning appliances. This strategy will substantially reduce cumulative contributions to PM<sub>2.5</sub> annual emissions and also substantially reduce PM<sub>2.5</sub> emissions that contribute to high 24-hour concentrations during poor air quality periods.

**Advantages:**

- (1) The control strategy will directly reduce emissions from one of the largest sources of particulate emissions in the area.
- (2) PM<sub>2.5</sub> emissions will be substantially reduced. This will allow the municipality to get a head-start in reducing PM<sub>2.5</sub> annual and 24-hour concentrations in order to comply with the CCME Canada-wide Standards for Particulate Matter to be met by the year 2010.
- (3) The control strategy will establish a voluntary change-out program. In the long term, this control strategy would allow the municipality to avoid further regulatory actions such as mandatory no-burn days.

**Disadvantages:**

- (1) The change-out program is voluntary. The program will need significant participation from the public to be successful.
- (2) The municipality would need to commit staff resources to develop the change-out program and to administer the program once it is established.
- (3) A change-out program will have a better chance of success if it is supported by a rule that prohibits the installation of woodburning appliances that do not meet specified standards for low emissions (EPA or CSA B 415 standard).

**Costs to Private Citizens:** The change-out program would be voluntary. There would be no costs to private citizens to participate in these programs. It should be noted that the program would provide assistance to cover only a portion of the costs to convert or remove a woodburning appliance. The remaining costs will need to be paid by the participant.

**Costs to Public Sector:** The municipality would incur substantial costs to develop the change-out program and to administer the program once it is established. These costs cannot be estimated at this time and will vary depending on the type of program created.

**Emissions Savings:** Substantial emissions savings are anticipated with the removal or conversion of woodburning appliances with cleaner burning appliances.

**Enforcement:** Although the program will be voluntary, enforcement provisions would need to be developed as part of the program to ensure that participants comply with all conditions and requirements of the program.

**Implementation Guidelines:**

As a first step, the municipality should get an idea of its own situation by gathering information such as:

- total number of residential units
- total number of woodstoves in use
- breakdown on woodstoves in use as certified or conventional
- breakdown on type of use (primary heating, secondary heating and pleasure use).

This type of data can be gathered through a representative survey and would give an assessment of the extent of the problem. It can be further used to tailor the change-out program and to establish a basis of comparison to assess its success.

From Canadian<sup>2</sup> experience we can draw the following guidelines:

(1) First and foremost the change-out program must be supported by an education campaign:

- To raise awareness of and educate the woodburning public about the importance of efficient, safe, smoke-free woodburning.
- To help those who heat with wood to improve their burning practises and make them aware of the advantages of new technology appliances.

A final objective would be:

- To provide incentives to homeowners to replace their conventional old technology woodburning appliances, with new higher-efficiency/lower emissions EPA or CSA certified appliances.

(2) The change-out program should be managed by municipal staff. To be successful they will need multistakeholder program partners to carry the message and provide the incentives. Suggested partners are:

- Retailers, manufacturers, distributors and their trade organizations (HPBAC).
- Gas industry
- Recyclers
- Wood Energy Technicians (WETT)
- Association des professionnels du chauffage (APC)

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<sup>2</sup> The 2004 Great Okanagan Wood Stove Exchange Program – Synopsis. Submitted by The Central Okanagan Regional District Air Quality Program, June 10, 2004

Feasibility Assessment of a Change-out/Education Program for Residential Wood Combustion – A Step-by-Step Approach to a National Program Aimed at Reducing Emissions from Residential Wood Combustion. Jointly prepared by the Canadian Centre for Pollution Prevention, CULLBRIGE™ Marketing and Communications and Action-Environment for the Canadian Council of Ministers of the Environment, June 9, 2004

Feasibility of Developing and Piloting a Woodstove Exchange Program – Prepared for the Clean Air Foundation by Gulland Associates Inc. April 2003

- Government
  - Health and environmental groups
  - Insurance industry.
- (3) Develop change-out incentives with the industry and government when possible. Some will suggest a 15 % rebate or trade-in allowances on new heating appliances to be matched by government incentive. For homeowner's participating in a financial assistance/incentive program, the municipality could waive any building permit fees for the installation of new stoves and other work approved under the program.
- (4) To be eligible for the change-out program, participant's appliances must be permanently disabled and recycled. A way to do this would be to require retailers to make a declaration and provide their signature confirming that the change-out stove was disabled and recycled. They would also be required to state in what manner the appliance was disabled and where it was recycled. This is also a way to track change-out numbers.
- (5) Change-out program results should be tracked for:
- Number and type of change-outs (e.g., EPA or CSA certified woodburning appliances, gas appliances, pellet stoves, and electric appliances). Since change-out appliances are put out of service, emissions reduction calculations can be derived from these data.
  - An indication of the factors that influenced people to participate in the change-out program (efficiency, safety, environment, energy, cost, aesthetics, convenience).
- (6) The change-out program should be well timed. Timing of program delivery is influenced by three key factors:
- Specialty retailers are motivated to participate in woodstove change-out programs during the winter/spring months, a slower time of year for woodstove sales.
  - The purchase of a new EPA or CSA certified woodstove is a significant investment. The decision to make this investment is often made prior to the onset of the winter season and made more often by frequent users of woodstoves.
  - winter/spring months are good periods for public education workshops.

Therefore, there needs to be an action plan with a long-term commitment. Participating retailers could issue a certificate for rebate to those who attend public education workshops that would be valid for up to a one-year period upon being issued.

- (7) The change-out program should be coordinated with a public education and information strategy to:
- Have a strong promotional strategy to publicize the change-out program. All media resources should be used to make all property owners and residents aware of the program.
  - Schedule workshops (similar to Burn-It-Smart) that go hand in hand with a change-out program to raise awareness of and educate the woodburning public about the importance of efficient, safe, smoke-free wood burning and to help those who heat with wood to improve their burning practises and make them aware of the advantages of new technology appliances.

The municipality should consider at their workshop:

- Attendance by chimney sweeps, hearth product retailers, politicians and local government staff.

- Featuring retailer showcases to allow residents to view a myriad of EPA or CSA certified wood, gas, pellet and electric heating appliances from various retailers and manufacturers involved in the change-out program.
  - The set-up of a burn display at each workshop to demonstrate the value in burning smart.
  - Other highlights of the workshop like firewood moisture testing and door prizes for those in attendance.
- (8) The municipal manager could initiate discussions with other municipalities in the air shed area on coordinating the municipality's change-out program with any program administered by other municipalities. The objective of the discussions should be to coordinate administrative procedures to streamline the administrative process and reduce costs.
- (9) Financial incentives and assistance should be proportional to the anticipated emissions savings. For example, incentives and assistance should be greater for a change-out of a non-certified woodburning appliance to a gas-service stove and less for a change-out to an EPA or CSA certified appliance. Incentives and assistance could focus on permanent residents since emissions from permanent residents are greater than seasonal residents.

**Who is doing it? :** Central Okanagan, BC; Columbia-Kootenay, BC; Truckee, NV; Bend, OR;

## **Option b) Time Limit**

**Description:** All woodburning appliances within the municipality that are not certified shall be removed from all properties by a certain date or rendered permanently inoperable by a certain date.

**Targets:** This strategy is targeted towards fine particulate emissions from non-certified woodstoves and fireplace inserts in existing buildings and structures. Its goal is to reduce or eliminate particulate matter emissions from these non-certified appliances by removing non-certified appliances in existing buildings within a reasonable time frame. This strategy will substantially reduce PM<sub>2.5</sub> annual emissions and also substantially reduce PM<sub>2.5</sub> emissions that contribute to high 24-hour concentrations during poor air quality periods.

### **Advantages:**

- (1) The control strategy will directly reduce particulate emissions from the largest source of emissions in the area.
- (2) As the time limit gets nearer, the control strategy will quicken the removal of non-certified appliances in the municipality. PM<sub>2.5</sub> emissions will be substantially reduced and will allow the municipality to get a head-start in reducing PM<sub>2.5</sub> annual and 24-hour concentrations in order to comply with the CCME Canada-wide Standards for Particulate Matter to be met by the year 2010.

### **Disadvantages:**

- (1) The municipality would have to undertake an extensive enforcement program at the end of the deadline as many homes may still have a non-certified appliance and would be in violation of the ordinance.
- (2) There will be substantial costs to homeowners that rely on woodstoves as their primary heating source as these homeowners must replace the non-certified appliance with an EPA or CSA certified appliance or install and utilize another type of heating source.

### **Costs to Private Citizens:**

Homeowners will be responsible for the costs of removing the non-certified woodstove or fireplace insert from the home and disposing it at an approved site. Costs for removal and disposal will be several hundred dollars, although municipal assistance may be available to cover some of these costs. If a homeowner wishes to replace the non-certified appliance with an EPA or CSA certified appliance or gas-service stove, or if a woodstove is the primary heating source for the home, it may cost the homeowner from \$1,800<sup>3</sup> to \$5,000 to purchase and install a new stove. There will also be minor costs for removing the non-certified appliance including inspections (\$50 to \$75) and municipal processing of the required notices (\$50 to \$100).

**Costs to Public Sector:** The municipality will incur public costs to administer and enforce the by-law.

**Emissions Savings:** This part of the control strategy will result in minor reductions in particulate matter emissions before the deadline because only a few homeowners will voluntarily remove their non-certified appliance before the end of deadline. Once the deadline is passed, PM reductions should increase considerably.

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<sup>3</sup> Feasibility Assessment of a Change-out/Education Program for Residential Wood Combustion – A Step-by-Step Approach to a National Program Aimed at Reducing Emissions from Residential Wood Combustion. Jointly prepared by the Canadian Centre for Pollution Prevention, CULLBRIGE™ Marketing and Communications and Action-Environment for the Canadian Council of Ministers of the Environment, June 9, 2004

**Enforcement:** An enforcement program could be established as part of the by-law. The enforcement program would include a method to identify those homes that may have a non-certified appliance and may include a registration and/or inspection program to catalogue homes with non-certified appliances. At least six months prior to the end of the deadline, the municipality would directly notify all property owners that may have a non-certified appliance of the deadline to remove any and all non-certified appliances from their home. At the end of the deadline period, enforcement of the by-law will be given high priority, and the by-law enforcement officer would initiate a program to identify those property owners in violation and would take swift action to compel removal of the non-certified appliances in accordance with the by-law.

**Implementation Guidelines:**

- (1) Municipal staff will work with local woodstove retailers to establish a formal program for the disposal of non-certified woodstoves once they are removed from a residence.

**Who is doing it? :** Truckee, NV.

## **Option c) Prior Sale or Transfer of Real Property**

**Description:** Prior to the completion or consummation of a sale or transfer of any real property on or after a certain date, all existing woodburning appliances that are not certified shall be replaced, removed or rendered permanently inoperable.

To facilitate the removal or replacement of non-certified woodstoves and fireplace inserts, this control strategy would require a property owner to remove all existing non-certified woodburning appliances in a residence or commercial business prior to sale or transfer of the property. The non-certified appliance may be replaced with a certified appliance.

**Targets:** This strategy is targeted towards fine particulate emissions from non-certified woodstoves and fireplace inserts in existing buildings and structures. Its goal is to reduce or eliminate particulate matter emissions from these non-certified appliances by removing non-certified appliances in existing buildings within a reasonable time frame. This strategy will substantially reduce PM<sub>2.5</sub> annual emissions and also substantially reduce PM<sub>2.5</sub> emissions that contribute to high 24-hour concentrations during poor air quality periods.

### **Advantages:**

- (1) The control strategy will directly reduce particulate emissions from the largest source of emissions in the area.
- (2) In a fast market, the control strategy will quicken the removal of non-certified appliances in the municipality. PM<sub>2.5</sub> emissions will be substantially reduced and will allow the municipality to get a head-start in reducing PM<sub>2.5</sub> annual and 24-hour concentrations in order to comply with the CCME Canada-wide Standards for Particulate Matter to be met by the year 2010.
- (3) The removal of non-certified appliances prior to the sale of a home will result in immediate emissions reductions.
- (4) The non-certified appliances will be removed or replaced prior to the sale of a house and the costs for removal or replacement may be handled through the home sale transaction, which may be a more favourable time for the property owner to remove or replace the appliance.

### **Disadvantages:**

- (1) The control strategy will be a regulatory measure. It will be an additional item that a seller must address as part of a home sale transaction.
- (2) There will be substantial costs to homeowners that rely on woodstoves as their primary heating source as these homeowners must replace the non-certified appliance with an EPA or CSA certified appliance or install and utilize another type of heating source.

**Costs to Private Citizens:** Homeowners will be responsible for the costs of removing the non-certified woodstove or fireplace insert from the home and disposing it at an approved site. Costs for removal and disposal will be several hundred dollars. If a homeowner wishes to replace the non-certified appliance with an EPA or CSA certified appliance or gas-service stove, or if a woodstove is the primary heating source for the home, it may cost the homeowner from \$1,800 to \$5,000 to purchase and install a new stove. There will also be minor costs for removing the non-certified appliance including inspections (\$50 to \$75) and municipal processing of the required notices (\$50 to \$100).

**Costs to Public Sector:** The municipality will incur public costs to administer and enforce the by-law. The public costs for the removal of non-certified appliances prior to home sale should be

recovered through municipality processing and enforcement fees that are passed through to the seller and buyer.

**Emissions Savings:** The increase in annual savings will decrease as the supply of homes with non-certified woodstoves becomes smaller and a lesser number of non-certified woodstoves are removed each year through this program.

**Enforcement:** An enforcement program will be established in which the by-law code enforcement officer would review recorded deeds transferring property to verify that a notice of exemption or compliance with the municipal by-law was filed on the subject property prior to its transfer. If the property does not have the required notice, the property owner will be notified that they are in violation of the municipal by-law. The property owner will be able to resolve the violation by obtaining the required notice identifying that the property transfer was not subject to the municipal by-law or the property complies with the by-law requirements.

**Implementation Guidelines:**

- (1) Prior to drafting the implementing ordinance, municipal staff should meet with an ad-hoc committee of members of the real estate community to identify ways to streamline the review process, to provide better coordination and communication between the municipal and property owners and to limit the role of the real estate community in the process.
- (2) A realtor's responsibility under the ordinance should be limited to disclosure of the requirements of the by-law to the seller and buyer. The municipality should not hold a realtor responsible or subject the realtor to enforcement if the seller and/or buyer fails to comply with the regulations of the by-law.
- (3) The control strategy should apply only to sales or transfers of property subject to the documentary transfer tax. Exemptions could be provided for gift deeds, minor transfers not involving financial consideration, foreclosure sales, trustee's sale and involuntary transfers under a deed of trust.

(2) **Who is doing it?** : Truckee, NV; Santa Rosa, CA; Bend, OR.

## 4. No Burn Days

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### Option a) Voluntary Curtailment

#### **Option a.1) Curtailment of Non-certified Woodburning Appliances**

**Description:** The local authority may issue a declaration of an “Air Quality Advisory Period” through local communications media requesting residents to voluntarily curtail the use of non-certified woodburning appliances whenever conditions within the region are projected to cause ambient air quality concentrations of PM<sub>2.5</sub> that exceed a certain concentration (micrograms per cubic meter).

**Targets:** This strategy is targeted towards PM<sub>2.5</sub> emissions from woodburning appliances. Its goal is to reduce particulate emissions from woodburning appliances during poor air quality periods. It will reduce 24-hour concentrations of PM<sub>2.5</sub> and result in reductions in annual emissions.

**Advantages:**

- (1) The control strategy is voluntary and does not impose mandatory restrictions or penalties on residents on the use of their woodburning appliances during poor air quality periods. It may be an appropriate first step toward imposition of mandatory restrictions.
- (2) The voluntary episodic curtailment program can be developed and implemented in a short period with minimal time and effort required by the municipality and an air quality forecast system. Any emissions savings will be relatively free because of the low cost to implement the program.
- (3) It is anticipated that the control strategy will reduce 24-hour concentrations of PM<sub>2.5</sub> on the worst air quality days when the municipality is most likely to exceed its defined jurisdiction (provincial or local) numbers.
- (4) This will help achievement of CCME Canada-wide Standards for Particulate Matter.

**Disadvantages:** Because the control strategy is voluntary and depends on citizen participation, its effectiveness will be limited. It may not *substantially* reduce particulate emissions from woodburning appliances.

**Costs to Private Citizens:** The control strategy will not impose mandatory costs on private citizens. Citizens that voluntarily participate by not using their woodburning appliance on poor air quality days may have additional costs in using other heating systems.

**Costs to Public Sector:** There will be public costs associated with the preparation of the guidelines to implement the voluntary curtailment program. There will be operational costs associated with municipal staff informing the public of voluntary no-burn days

**Emissions Savings:** Emissions savings cannot be estimated at this time and will not be able to be quantified once the program is underway. Emissions savings will vary dependent on citizen participation. For example, the city of Lakeview, Oregon estimated emissions savings of 5% to 10% from woodburning appliances upon implementation of their voluntary curtailment program.

**Enforcement:** This program is voluntary. No enforcement provisions are necessary.

**Implementation Guidelines:**

- (1) The program will include a communication strategy to inform residents when poor air quality days are called and of the municipality request to not use or curtail use of woodburning appliances on these days. The communication strategy may use a variety of methods to advertise this information including cable television, radio, informational flyers, and community information boards.
- (2) The program should include a monitoring and surveillance program to estimate participation of residents and the program's effectiveness.
- (3) It should be combined with a public education program on ways to burn cleaner.

**Who is doing it? :** Truckee, NV; various air sheds in BC; Montreal, QC.

## Option a.2) Staged Curtailment for All Woodburning Appliances

**Description:** This is a “two stage” approach to voluntary curtailment. Residents would voluntarily curtail the use of all non-certified woodburning appliances during periods that designate a “Yellow Air Quality Advisory Period” and all woodburning appliances during periods that designate a “Red Air Quality Advisory Period”. The colour code is an analogy to the street light system: green, no restriction; yellow, partial restriction; red, total restriction.

**Targets:** This strategy is targeted towards PM<sub>2.5</sub> emissions from woodburning appliances. Its goal is to reduce particulate emissions from woodburning appliances during poor air quality periods. It will reduce 24-hour concentrations of PM<sub>2.5</sub> and result in reductions in annual emissions.

### Advantages:

- (1) The control strategy is voluntary and does not impose mandatory restrictions or penalties on residents on the use of their woodburning appliances during poor air quality periods. It may be an appropriate first step toward imposition of mandatory restrictions.
- (2) The voluntary episodic curtailment program can be developed and implemented in a short period with minimal time and effort required by the municipality and an air quality forecast system. Any emissions savings will be relatively free because of the low cost to implement the program.
- (3) It is anticipated that the control strategy will reduce 24-hour concentrations of PM<sub>2.5</sub> on the worst air quality days when the municipality is most likely to exceed its defined jurisdiction (provincial or local) numbers.
- (4) This will help achievement of CCME Canada-wide Standards for Particulate Matter.

**Disadvantages:** Because the control strategy is voluntary and depends on citizen participation, its effectiveness will be limited. It may not *substantially* reduce particulate emissions from woodburning appliances.

**Costs to Private Citizens:** The control strategy will not impose mandatory costs on private citizens. Citizens that voluntarily participate by not using their woodburning appliance on poor air quality days may have additional costs in using other heating systems.

**Costs to Public Sector:** There will be public costs associated with the preparation of the guidelines to implement the voluntary curtailment program. There will be operational costs associated with municipal staff informing the public of voluntary no-burn days

**Emissions Savings:** Emissions savings cannot be estimated at this time and will not be able to be quantified once the program is underway. Emissions savings will vary dependent on citizen participation. For example, the city of Lakeview, Oregon estimated emissions savings of 5% to 10% from woodburning appliances upon implementation of their voluntary curtailment program. There should be an additional reduction of PM<sub>2.5</sub> emissions with this “two stage” option.

**Enforcement:** This program is voluntary. No enforcement provisions are necessary.

### Implementation Guidelines:

- (1) The program will include a communication strategy to inform residents when poor air quality days are called and of the municipality request to not use or curtail use of woodburning appliances on these days. The communication strategy may use a variety of methods to advertise this information including cable television, radio, informational flyers, and community information boards.

- (2) The program should include a monitoring and surveillance program to estimate participation of residents and the program's effectiveness.
- (3) It should be combined with a public education program on ways to burn cleaner.

**Who is doing it? :** N/A.

## **Option b) Mandatory Curtailment**

### **Option b.1) Curtailment of Non-certified Woodburning Appliances**

**Description:** This strategy is the mandatory version of the voluntary episodic curtailment program. Instead of requesting voluntary cooperation, this strategy would prohibit the use of all non-certified woodburning appliances during periods that designate the poorest air quality periods. Non-compliance with this prohibition would be a violation of the municipal by-law and violators would be subject to fines and penalties. Exemptions may be provided for households that rely on woodburning appliances as their primary heating source.

**Targets:** It is targeted towards fine particulate matter emissions and those periods when the municipality is likely to exceed the 24-hour concentration for PM<sub>2.5</sub>.

**Advantages:**

- (3) It gives a strong message that certified appliances are better than non-certified appliances.
- (4) It will reduce 24-hour concentrations of PM<sub>2.5</sub> on the worst air quality days when the municipality is most likely to exceed its defined jurisdiction (provincial or local) numbers.
- (5) This will help achievement of CCME Canada-wide Standards for Particulate Matter.

**Disadvantages:**

- (6) It implies monitoring and enforcement with associated costs.
- (7) There is only one step: Red

**Costs to Private Citizens:** Citizens not using their woodburning appliance on poor air quality days may have additional costs in using other heating systems

**Costs to Public Sector:** There will be public costs associated with the preparation of the guidelines to implement the mandatory curtailment program and the preparation and implementation of an education package. There will be operational costs associated with municipal staff informing the public of mandatory no-burn days and enforcing the by-law

**Emissions Savings:** There should be a reduction of PM<sub>2.5</sub> emissions.

**Enforcement:** An enforcement program would be established as part of the by-law. The enforcement program could include a method to identify those homes that may have a non-certified appliance so that it will be easier to monitor and enforce compliance.

**Implementation Guidelines:**

- (1) The program should include a communication strategy to inform residents when poor air quality days are called and of the municipality request to not use or curtail use of woodburning appliances on these days. The communication strategy may use a variety of methods to advertise this information including cable television, radio, informational flyers, and community information boards.
- (2) It should be combined with a public education program on ways to burn cleaner

**Who is doing it?** : Puget Sound Clean Air Agency; Shasta County, CA; Santa Rosa, CA; Rapid City, SD; Albuquerque, NM; Boulder, CO; Feather River, CA; Whitehorse, YK; Prince George, BC; State of Oregon

**Notes:**

**Canada**

<b>Jurisdiction</b>	<b>Enforcement</b>	<b>Communication</b>	<b>Penalties</b>
Whitehorse, YK.	The city no longer has no-burn periods. In the past, by-law officers could simply drive along a street and see where there was smoke and then inform the resident that a no-burn was in effect. If someone wanted to apply for an exemption, the city paid for it through the wood smoke inspector.	In the past, there were sandwich board signs that were installed at the entrance to the affected subdivisions, and there were radio announcements.	
Prince George, BC	Respect of the by-law is verified through its enforcement and residents' complaints.  If there is a complaint, the resident must prove that they are a sole woodburner. A call to the gas company, the only other source of heating in the region, can help prove it. There is no permit system about this matter.  Education and communication are the best strategies.	The communication is done by the Ministry of Water, Land and Air Protection, who calls the advisory. It is on the TV, radio and newspaper. There is also a 24 hour recorded phone line that residents can call.	There is a warning. For further violations, the resident goes to court and is fined \$50 to \$100.

**USA**

Jurisdiction	Enforcement	Communication	Penalties
<p>Albuquerque, NM</p>	<p>The program started voluntary. But there was still a problem with carbon-monoxide periods so it became mandatory even if the voluntary phase helped a lot.</p> <p>The air quality division takes as many staff as it can to go on patrol at night. They cover areas in teams of 2 or 3 persons. When they see smoke coming out of the chimney, they decide and check if people are exempted for sole burners or medical reasons (they should be registered at the City Hall). If they are not on the list, they are potential offenders.</p> <p>Staff checks if a no-burn period is respected by 5 o'clock pm. People see the city vehicles and know that the measure is applied, so compliance is good.</p> <p>There is a three-hour period of burndown, but it is more for people who started a fire at 10 o'clock for example. Inspections are rarely made at 11 am.</p> <p>About 400 to 500 demands for an exemption are received each year, and about 20% of them are verified. It is not a lot of demand for a 500 000 community.</p> <p>Complaints can be received, but it will be more difficult if people call during the evening or during week-ends.</p> <p>Authorities have two sources of income because they don't charge any fees. There is a grant from the EPA of 500 000 dollars a year and the city is giving a little over a million dollars a year for the program. The air quality division has staff already in place, who can have other functions during summer time.</p> <p>Starting with a voluntary program is a good strategy</p>	<p>In the mid 80's, authorities tried to use local television during weather forecasts. The meteorologists were putting it on the news. In recent years, notifications are sent to radio stations.</p> <p>A meteorologist decides early in the morning weather or not there will be a no-burn period. The city has a \$10 000 a year contract for weather information. If it looks like it will be stagnant, the staff talk to the division manager. If it doesn't look good, the no-burn period is called at 11 o'clock in the morning. It is communicated by radio and a phone message is recorded that people can call (about 20 to 30 calls can be received at the same time).</p> <p>For a while, variable message signs were rented, like the ones seen on construction projects. They were rented around November and December, the most critical part of the year.</p>	<p>In the past authorities were stricter and did not give warnings. In recent years, notices of non-compliance are issued, which are really just a warning. A door hanger is left where people don't comply, or inspectors knock on the door to warn homeowners. The compliance is very good.</p> <p>In order for the authorities to issue a violation, they need to document that visible smoke was present for at least 20 minutes. US EPA fire stoves are legal, but it is required that they burn with no visible emissions after the first 20 minutes.</p> <p>When a violator is caught, he has to go to the metropolitan court system to pay a "window fine", that ranges from \$50 to \$100.</p>

## **Option b.2) Staged curtailment for All Woodburning Appliances**

**Description:** This is a mandatory “two-stage” by-law. It is analogous to the street light system: green, no restriction; yellow, partial restriction; red, total restriction. It would prohibit the use of all non-certified woodburning appliances during periods that designate a “Yellow Air Quality Advisory Period” and all woodburning appliances during periods that designate a “Red Air Quality Advisory Period”. Non-compliance with this prohibition would be a violation of the municipal by-law and violators would be subject to fines and penalties. Exemptions would be provided for households that rely on woodburning appliances as their primary heating source

**Targets:** It is targeted towards fine particulate matter emissions and those periods when the municipality is likely to exceed the 24-hour concentration for PM<sub>2.5</sub>.

### **Advantages:**

- (1) It gives a strong message that certified appliances are better than non-certified appliances.
- (2) It will reduce 24-hour concentrations of PM<sub>2.5</sub> on the worst air quality days when the municipality is most likely to exceed its defined jurisdiction (provincial or local) numbers.
- (3) This will help achievement of CCME Canada-wide Standards for Particulate Matter.

**Disadvantages:** It implies monitoring and enforcement with associated costs.

**Costs to Private Citizens:** Citizens not using their woodburning appliance on poor air quality days may have additional costs in using other heating systems.

**Costs to Public Sector:** There will be public costs associated with the preparation of the guidelines to implement the mandatory curtailment program and the preparation and implementation of an education package. There will be operational costs associated with municipal staff informing the public of mandatory no-burn days and enforcing the by-law.

**Emissions Savings:** There should be an additional reduction of PM<sub>2.5</sub> emissions with this “two-stage” by-law.

**Enforcement:** An enforcement program will be established as part of the by-law.

### **Implementation Guidelines:**

- (4) The program should include a communication strategy to inform residents when poor air quality days are called and of the municipality request to not use or curtail use of woodburning appliances on these days. The communication strategy may use a variety of methods to advertise this information including cable television, radio, informational flyers, and community information boards.
- (5) It should be combined with a public education program on ways to burn cleaner.

**Who is doing it? :** Puget Sound Clean Air Agency; Spokane, WA; Shasta County, CA; Santa Rosa, CA; Rapid City, SD; Boulder, CO; Feather River, CA; Jackson County, OR; State of Oregon; Juneau, AK.

### **Notes:**

### **USA**

<b>Jurisdiction</b>	<b>Enforcement</b>	<b>Communication</b>	<b>Penalties</b>
Spokane County, CO	<p>Field staff perform surveillance in the areas where burning has been restricted, looking for use of woodburning appliances, discussing certification and operation of the appliance and educating the operator about requirements during periods of curtailment, looking for excess opacity, issuing warnings and formal enforcement actions.</p> <p>People who want to apply for an exemption have to pay unless they qualify in the low income energy assistance program.</p> <p>Education and visits by field staff during curtailment periods achieved great compliance.</p>	Notification is provided by notice on a pre-recorded message (burning information hotline) phone line, on the website and notices are sent out to media contacts.	<p>Generally, individuals find out about restrictions from visits by the field staff. If they can qualify for an exemption and are interested in pursuing this option, they are not considered as offenders.</p> <p>Penalties: 150\$ for any violation and from \$50 to \$250 additive penalties depending of the gravity of the offence.</p>
Jackson County, OR	Air quality is good; the county has a dramatic improvement of air quality.	The last yellow day was in 1994. There is still an advisory program, but mostly turned against open burning. The authorities still have the power to issue an alert. The information is issued everyday but it's mostly green.	Penalties are issued n municipal court. The only need is for open fires. Citations are issued for repeated offences. For a first offence, only a warning is made.

## 5. Nuisance

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**Description:** This strategy applies a nuisance by-law where woodburning appliance fires shall be maintained so as not to cause a nuisance for more than two minutes in succession except during a thirty-minute period following starting or re-fuelling of the appliance. This thirty-minute exemption will only be permitted once during a four-hour period.

**Targets:** It is targeted towards the control of the denseness of fine particulate matter emissions.

**Advantages:**

- (1) It is recourse for people being “smoked out” of their house from a neighbour.
- (2) It can be used as an educational tool.

**Disadvantages:** There is a cost for implementation.

**Costs to Private Citizens:** There are no costs.

**Costs to Public Sector:** The municipality will need to support an education component and enforcement staff.

**Emissions Savings:** Emissions saving will vary from place to place but cannot be predicted.

**Enforcement:** This by-law can be enforced through complaint and or planned patrol. There should be a clean burning education component attached.

**Implementation Guidelines:**

- (1) A communication strategy to inform residents of this by-law should be included.
- (2) A two-step enforcement policy should be used to enforce this by-law.
  - First offence should be dealt with by a warning accompanied by a clean burning education component including for example the offer of educational materials.
  - Second offence should be dealt with a ticket.

**Who is doing it? :** Central Okanagan, BC.

## 6. Opacity

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**Description:** This strategy applies an opacity limit where, within the municipality, no person owning or operating a woodburning appliance shall at any time cause, allow or discharge emissions from such appliance which are of an opacity greater than twenty (20) percent.

This would limit the denseness of the smoke coming from the chimney. Opacity is a measurement of the degree to which smoke obstructs the view of objects behind it. It can be set up as a nuisance regulation and be put in action through complaint.

In many jurisdictions, the legal opacity for smoke emissions from woodburning appliances is up to 20%. This limit can usually be achieved by building small, hot fires, allowing the fire to get plenty of air and making sure that seasoned wood is being burned. Other jurisdictions will go as high as 50% opacity limit.

Measuring the opacity of smoke can be done in two ways 1) a person who is certified for visible emissions measuring may visually assess a smoke plume coming from a chimney <sup>4</sup>or 2) using an instrument called nephelometer, smoke opacity can be measured directly from the chimney flume. A nephelometer instantaneously measures the scattering coefficient of light caused by suspended particles in the air.

**Targets:** It is targeted towards the control of the denseness of fine particulate matter emissions.

**Advantages:**

- (1) Objective measure of polluting effect of woodburning appliances or its operation
- (2) Nephelometers are cheap and accurate.

**Disadvantages:**

Measuring visible emissions

- (1) Need certified personnel.
- (2) Visible opacity measuring cannot be done at night.

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<sup>4</sup> The opacity of the smoke leaving a chimney is measured by the Ringelmann method in which a trained observer makes a visual estimate of its appearance, referencing Figure #1.

**RINGELMANN VISUAL CHART**

Ringelmann 0 - 0% opacity (clear)  
Ringelmann 1 - 20% opacity  
Ringelmann 2 - 40% opacity  
Ringelmann 3 - 60% opacity  
Ringelmann 4 - 80% opacity  
Ringelmann 5 - 100% opacity (black)

**FIGURE #1**



- (3) It is time consuming, approximately 30 uninterrupted minutes of visible assessment to make a proper opacity measurement. By-laws enacted in other areas allow for a 20 minute start up period and 20 minute burn down period where the opacity of smoke can be high, so a 30 minute observation time would be appropriate for by-law personnel. Often not enforced as a result.

Measuring with a Nephelometer

- (1) Need certified personnel
- (2) The main problem with using a nephelometer is that a sample stream of the smoke is required, which means climbing on top of the roof to get a reading. Residents and by-law personnel would most likely find this method intrusive and dangerous; however, this method could be used to back up visual readings in specific cases where the homeowner would like the test done.
- (3) Method used mostly for industrial purposes.

**Costs to Private Citizens:** There are no costs.

**Costs to Public Sector:** Costs for personnel certification, acquiring a nephelometer, monitoring and enforcing resources. There is also a cost for an education approach.

**Emissions Savings:** There should be some emissions savings.

**Enforcement:** It can be enforced through complaints and/or by regular patrols on high pollution periods.

**Implementation Guidelines:**

- (1) It should be combined with a public education program given by enforcement personnel on ways to burn cleaner.
- (2) A nephelometer test of opacity could be used within neighbourhoods to test localized ambient air quality over a period of time. This would be a good educational tool to get the whole neighbourhood involved. The results would be used to demonstrate to the neighbourhood just how bad their air quality actually gets when wood stoves in their neighbourhood are producing too much smoke.

**Who is doing it? :** Spokane, WA; Jackson County, OR; Juneau, AK; Montreal, QC (visible emissions only)

**Notes:**

Canada

Jurisdiction	Limit	Method of measurement	Enforcement
Whitehorse, YK	(N/A)	(N/A)	The Council and senior management recommended that the wood smoke by-law officer was not needed anymore; enforcement was difficult and would not stand up in court. It was judged that the best vehicle for wood smoke was public education, so the by-law was repealed.

<b>Jurisdiction</b>	<b>Limit</b>	<b>Method of measurement</b>	<b>Enforcement</b>
North Saanich, BC	20%	No measurement, digital pictures where there is a complaint.	It is verified by complaints only. Two firefighters drive around the city and stop to speak to homeowners where there is a lot of smoke. It would be very difficult to prove a violation because actual measurements were never taken. Everyone complied.
Greater Vancouver Regional District, BC	10% for heating installations, no specific limit for domestic fireplaces and wood stoves.	Visual method.	Heating installations are inspected on a complaint-basis only. The by-law has not been tested in court, but any penalties assessed would be at the discretion of a judge. The costs of enforcing this by-law are included in the over-all program budget.

## USA

<b>Jurisdiction</b>	<b>Limit</b>	<b>Method of measurement</b>	<b>Enforcement</b>
Spokane County, CO	Average opacity in excess of 20% for any consecutive six minutes in any one hour is a violation of the opacity standard.	Compliance is determined by using EPA Reference Method 9. 3. Inspectors are visible emissions readers. Determinations of compliance with opacity limits generally occurs 25 times a year.	<p>Compliance is verified through education and enforcement (surveillance and complaint response) of opacity requirements.</p> <p>If opacity is higher than expected, but there is no violation, there might be a compliance assistance visit to provide the homeowner with public educational material. If the opacity exceeds the limits, a Notice of Violation is issued. Discussion with the homeowner may include a discussion of what is being burned in the woodburning appliance. If the resident admits to burning garbage or other prohibited materials, a NOV may include a citation to that effect also. Spokane has a PM10 non-attainment area.</p> <p>Penalties: \$150 for any violation and from \$50 to \$250 additive penalties depending of the gravity of the offence.</p> <p>Educational outreach raised awareness of the issue, which increased the number of complaints received about burning prohibited materials, which in turn resulted in further educational outreach, which achieved greater compliance.</p>
Jackson County, OR	50% (that is what is written in the ordinance)	Visual method, by inspectors who are trained at college (opacity school)	<p>Air quality is better than ever as people have certified stoves and people burn efficiently. Smoke opacity is supposed to be measured every six months but it isn't anymore.</p> <p>The maximum fine is \$250 a day. The usual fine is between \$50 and \$100 but over the years, only 2 or 3 persons were fined. Education is the best, most effective strategy.</p>



## 7. Outdoor Solid-fuel Combustion Appliances

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**Description:** This by-law is intended to regulate and control installation and use of outdoor solid-fuel burning appliances. If a municipality wishes to limit the installation to certified appliances or to ban the installation of outdoor boilers, it may refer to Section 2 option b) or Section 4 respectively.

**Targets:** This control strategy targets PM<sub>2.5</sub> emissions. In addition to installation specifics, this strategy will prevent installation of outdoor solid-fuel burning appliances in residential areas

**Advantages:**

- (1) Easy to enforce as it can be tracked through building permits.
- (2) Reduces future air quality concerns.

**Disadvantages:** It does not address current problem caused by old appliances.

**Costs to Private Citizens:** There are no costs to private citizens.

**Costs to Public Sector:** There is a communication cost.

**Emission Savings:** No emissions savings were evaluated.

**Enforcement:** The regulations could be implemented by ordinance in the municipal building code. The building division could verify compliance with the regulations at the building permit review and building inspection stages.

**Implementation Guidelines:** A communication strategy to inform residents of this by-law should be included.

**Who is doing it? :** State of Connecticut (Total Ban); State of Vermont; Nation, ON

**Notes:** N/A

## 8. Emission Offsets (not included in model by-law)

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**Description:** The installation of woodstoves, fireplaces, and other solid fuel burning appliances will be prohibited unless particulate matter emissions from such appliances are offset or mitigated by 100% thereby resulting in no net increase of emissions into the air. This strategy could apply to all new installations including all new commercial, industrial, and public buildings; new multi-family residential buildings and dwellings; new single family residential dwellings including those on existing subdivision lots; and the installation of woodburning appliances in existing buildings and dwellings. An exemption will be provided for the replacement of a conventional woodburning appliance with a certified EPA or CSA appliance in the same building or dwelling. The control strategy will be implemented by imposition of a mitigation fee. As it is a no net increase of emissions approach it would work best in conjunction with a change-out program.

**Targets:** This strategy is targeted towards fine particulate emissions from woodburning appliances in new development including new single family dwellings on existing subdivision lots and the installation of new appliances in existing buildings and dwellings. Its goal is to prohibit net increases in particulate emissions from new woodburning appliances. The strategy will prevent increases in PM<sub>2.5</sub> annual emissions and 24-hour concentrations that may occur as a result of new development.

### **Advantages:**

- (1) The strategy is not mandatory – it is a voluntary program with the homeowner making the choice. The homeowner elects whether to install a woodburning appliance and pay the mitigation fee or to not install a woodburning appliance and use other sources for heating. The mitigation fee would only be applicable if the homeowner wishes to install a woodburning appliance; they would not have to pay the mitigation fee if they do not install a woodburning appliance. The strategy acts as an economic disincentive to installing a woodburning appliance and will encourage homeowners to seek other alternative sources of heating.
- (2) The strategy would not affect households that currently rely on woodstoves as their primary heating source. An exemption would be provided for the replacement of woodstoves in the same building or residence.
- (3) With the implementation of this strategy, new development would not cumulatively add to current emissions from woodburning appliances and emission levels and concentrations from woodburning appliances should not increase above current levels.
- (4) A separate financial program to utilize the mitigation fees generated by this program would have to be established. Fees could be used to finance a removal program.

### **Disadvantages:**

- (1) The strategy would only remain effective if there were a sufficient number of non-certified woodburning appliances that could be removed through a removal program.
- (2) The strategy may hinder the efforts of a change-out program to reduce emissions below current levels by lowering the finite number of non-certified appliances that are available to be removed. Non-certified appliances removed to offset new appliances result in no net increase in emissions, while non-certified appliances removed as part of a change-out program result in substantial emissions savings.

**Costs to Private Citizens:** The amount of the mitigation fee cannot be determined until a fee study is conducted. In Truckee NV, the amount is \$300 per lot or residential unit.

**Costs to Public Sector:** There will be public costs associated with the preparation of the mitigation fee study and the administration of the mitigation fee program. However, because the study and program are directly associated with implementation of the mitigation fee, they may be funded by the mitigation fees.

**Emission Savings:** There are no emissions savings. The objective of the strategy is to mitigate or offset new emissions. Any increase in wood combustion emissions from new development should be offset by reductions in emissions from existing development. Particulate matter emission levels and concentrations from woodburning appliances will not increase from new development.

**Enforcement:** Installation of a woodburning appliance, including replacements, requires the issuance of a building permit. The mitigation fee program would be implemented by ordinance in the building code. Compliance with the mitigation fee and credit program will be checked at the building permit review stage and mitigation fees will be assessed and collected with other building permit fees. Violations could be enforced by the code enforcement officer through the enforcement provisions of the building code.

### **Implementation Guidelines:**

- (1) A credit program may be considered to allow developers and property owners to remove woodburning appliances from existing buildings and dwellings and receive a credit to install woodburning appliances in new buildings and dwellings. A credit program, if adopted, would include specific regulations that would require the "taking" and "receiving" buildings and dwellings to be under same ownership and require credits to be used within one year after the appliance has been removed from the "taking" building or dwelling. Credits cannot be transferred.
- (2) The mitigation fees should be proportional to the anticipated emissions of the woodburning appliance. For example, fees for an appliance with emissions of 7.0g/kg should be double that of the fees for an appliance with emissions of 3.5 g/kg.
- (3) An exemption will be provided for the replacement or conversion of a conventional appliance with an EPA or CSA certified appliance.

**Who is doing it? :** Truckee, NV.

### **Notes:**

- (1) Truckee has adopted a mitigation fee for discretionary projects (i.e., new subdivisions, multi-family residential projects, etc.). The fee is \$300 US per lot or residential unit and has had some effect since several projects have prohibited woodstoves in their area.
- (2) In some cases, people wanting to own a woodburning appliance have to buy a certain number of permits, but there are a limited number of these permits. Once the limit is met, no more permits can be purchased. For example, in 1985 Telluride restricted the use of woodburning appliances and instituted an offset program of permit trading, which required that the owners of a new woodburning appliance purchase two permits from existing owners. The substitution of one for two appliances automatically reduces the total number in existence, but still allows limited use of new woodburning appliances when demand exists.

## **9. Awareness, Education and Communication (not included in model by-law)**

**Description:** Woodsmoke from woodburning appliances is one of the major sources of particulate matter emissions in Canada. Unfortunately, most homeowners are not aware of that fact. Moreover, they do not know how to properly operate a woodstove, which results in reduced efficiency and increased particulate emissions. To reduce particulate emissions from improper operation of woodstoves, municipalities in cooperation with other stakeholders need to inform and educate homeowners in the proper operation and maintenance of woodstoves and other woodburning appliances and of other ways to reduce dependence on woodstoves. The homeowners also need to be informed about the particulate matter pollution problem in the area and the health risks associated with high particulate matter concentrations to show the importance of proper operation and maintenance of woodstoves. Finally, advanced technology woodburning appliances or alternative energy appliances can be promoted to remove old conventional woodburning appliances.

Other stakeholders are:

- Retailers, manufacturers, distributors and their trade organizations (HPBAC).
- Gas industry
- Recyclers
- Wood Energy Technicians (WETT)
- Association des professionnels du chauffage (APC)
- Government
- Health and environmental groups
- Insurance industry

**Targets:** This control strategy is targeted towards PM<sub>2.5</sub> emissions from woodburning appliances. Its goal is to decrease particulate emissions from the improper operation and maintenance of these appliances.

### **Advantages:**

- (1) The control strategy is a non-regulatory program with low costs to implement.
- (2) Public education and information on the pollution problem and health risks will improve compliance and participation in other control strategies as the public becomes more aware of the severity of the problem.
- (3) The municipality can draw upon education packages already in existence in Canada.

### **Disadvantages:**

- (1) The control strategy will result in low emissions savings that cannot be estimated or calculated.
- (2) The control strategy can only be successful if the public is willing to participate.

**Costs to Private Citizens:** There will be no costs to an individual or business to participate in any public education or information program.

**Costs to Public Sector:** The municipality will fund the public education and information programs. The costs for such programs cannot be estimated until the scope of the programs are defined.

Information on costs and funding will be provided to the municipal council before any programs are approved and implemented.

**Emissions Savings:** Any direct emissions savings from woodburning appliances as a result of public education and information programs will be low. Savings will come from other control strategies, including by-laws that include education and information in their implementation process.

**Enforcement:** No enforcement provisions are necessary.

**Implementation Guidelines:**

- (1) The municipality should conduct a formal survey to gather information on homeowner's use of woodburning appliances. The survey will include but not be limited to questions on the type of appliance, annual amount of fuel wood expended, typical times the appliance is used, and the effect of natural gas availability on wood combustion appliance usage.
  - (2) The municipality should purchase wood moisture meters and loan these meters to homeowners and residents. This will enable homeowners and residents to measure wood moisture and make informed decisions on the purchase of wood. Information will be provided with the meters describing the advantages of dry wood over green wood.
  - (3) The municipality in cooperation with other stakeholders should conduct educational classes on the proper operation and maintenance of woodburning appliances. A building permit fee waiver for the installation of advanced technology woodburning appliances could be offered to homeowners who agree to attend these classes.
  - (4) Public education and information programs should be coordinated with the change-out program to encourage the removal of non-certified woodburning appliances. The public education and information programs should emphasize the community benefits of changing old conventional woodburning appliances for advanced technology woodburning appliances or alternative energy appliances or reducing use of woodburning appliances. Community benefits include improved air quality and reduced community health risks.
  - (5) The public education and information program should publicize all control strategies upon their implementation. The goal is to inform residents and property owners of the municipality's programs and regulations for particulate matter air quality in order to improve participation in voluntary programs and to increase compliance with mandatory regulations.
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## Website References

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### Canada

Colombia-Kootenay, BC: <http://stoveexchange.com/index.html>

Comox, BC: <http://www.town.comox.bc.ca/>

Great Vancouver District, BC: <http://www.gvrd.bc.ca/>

Golden, BC: <http://www.goldenbritishcolumbia.com/>

North Saanich, BC: <http://www.crd.bc.ca/nsaanich/>

Okanagan, BC: <http://www.regionaldistrict.com/>

Prince George, BC: <http://www.city.pg.bc.ca/>

Quesnel, BC : <http://www.city.quesnel.bc.ca/>

Whitehorse, YK: <http://www.city.whitehorse.yk.ca/>

### United States

Albuquerque, NM: <http://www.cabq.gov/>

Bend, OR: <http://www.ci.bend.or.us/>

Berkeley, CA: <http://www.ci.berkeley.ca.us/>

Boulder, CO: <http://www.ci.boulder.co.us/>

Crested Butte, CO: <http://www.gunnisoncrestedbutte.com/page.php>

Feather River, CA: <http://www.fraqmd.org/>

Jackson County, OR: <http://www.co.jackson.or.us/>

Juneau, AL : <http://www.juneau.com/>

Larimer, CO: <http://www.co.larimer.co.us/>

Livermore, CA: <http://www.ci.livermore.ca.us/>

Petaluma, CA : <http://cityofpetaluma.net/>

Rapid City, SD: <http://www.rcgov.org/>

San Jose, CA: <http://www.sanjoseca.gov/>

Santa Rosa, CA: <http://ci.santa-rosa.ca.us/>

Shasta, CA: <http://www.co.shasta.ca.us/>

Spokane, WA: <http://www.spokanecity.org/>

Truckee, NV: <http://www.townoftruckee.com/>

### Other

Association des professionnels du chauffage : <http://www.poelesfoyers.ca/pages/apcpag.html>

Burn it Smart!: <http://www.burnitsmart.org/english/index.html>

Chauffage au bois : soyons responsables!: <http://www.burnitsmart.org/francais/index.html>

Hearth, Patio & Barbecue Association: <http://www.hpba.org/>

Wood Energy Technology Transfer Inc : <http://www.wettinc.ca/>