

**AIR QUALITY MANAGEMENT
POLICY TOOLS LEADING
PRACTICE RESEARCH**



**AIR QUALITY MANAGEMENT POLICY TOOLS
LEADING PRACTICE RESEARCH**

**Prepared by
Markbek Resource Consultants**

in association with

Amec Earth & Environmental

For

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FOREWORD

In November 2006, the Ministry of the Environment notified stakeholders that the ozone “Planning Trigger” of the Clean Air Strategic Alliance (CASA) PM and Ozone Management Framework had been exceeded at several airsheds in Alberta. When the planning trigger is exceeded, the framework calls for the development of management plans to ensure that the Canada-wide Standards for PM and Ozone are not exceeded. The framework calls for these plans to be developed within two years. Alberta Environment has committed to a collaborative process to support airsheds in the development of management plans within the specified time frame. Should these plans not be completed on time, Alberta Environment will take steps to develop and implement a plan as per the PM and Ozone Framework.

The purpose of this study is to review available policy options and tools (regulatory and non-regulatory) aimed at managing particulate matter and ozone. The study identifies policy tools that are applicable to the following three levels:

- Provincial
- Municipal
- Airshed

This report documents over 100 policy tools that are used in air quality management by various jurisdictions around the world. Among the tools reviewed, twenty of them are profiled in detail. References are provided for further information on all the tools reviewed. These policy tools will be very useful for both governments and stakeholders in developing air quality management plans.

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GLOSSARY

AIRSHED: A geographical area that shares the same air because of topography, meteorology, and climate.

AIR QUALITY MANAGEMENT (AQM): Monitoring and protecting the quality of the air within a designated management zone.

AMMONIA (NH₃): A pungent colorless gaseous compound of nitrogen and hydrogen that is very soluble in water and can easily be condensed into a liquid by cold and pressure.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT): The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions for given regulated air pollutants and processes.

CLEAN AIR STRATEGIC ALLIANCE (CASA): The Clean Air Strategic Alliance is a multi-stakeholder partnership, composed of representatives selected by industry, government and non-government organizations, which recommends strategies to assess and improve air quality in Alberta.

CONSUMER PRODUCTS: Products such as hairspray, detergents, cleaning compounds, polishes, lawn and garden products, personal care products, and automotive specialty products which are part of our everyday lives and, through consumer use, may produce volatile organic air emissions which contribute to air pollution.

CRITERIA AIR CONTAMINANT (CAC): An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM₁₀ and PM_{2.5}.

NITROGEN OXIDES (NO_x): A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO₂) and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO₂ is a criteria air contaminant.

OZONE (O₃): A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. Ozone near the earth's surface causes numerous adverse health effects and is a criteria air contaminant and a major component of smog.

OZONE PRECURSORS: Chemicals such as non-methane hydrocarbons and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

PARTICULATE MATTER (PM_{2.5}): Particles, except pure water, that exists in the solid or liquid state in the atmosphere and are less than 2.5 microns in diameter. These particles are of great concern to public health as these particles are small enough to be inhaled into the deepest parts of the lung.

PRESCRIBED BURNING: The planned application of fire to vegetation to achieve any specific objective on lands selected in advance of that application.

SULFUR DIOXIDE (SO₂): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of SO₂. SO₂ and other sulfur oxides contribute to the problem of acid deposition. SO₂ is a criteria air contaminant.

TRANSPORTATION DEMAND MANAGEMENT (TDM): Transportation Demand Management includes a wide range of policies, programs, services and products that influence how people travel with the goal of making travel behaviour more sustainable. TDM measures are typically designed to reduce traffic congestion, reduce infrastructure and maintenance costs and improve traffic safety, air quality and accessibility.

VOLATILE ORGANIC COMPOUNDS (VOCs): Carbon-containing compounds that evaporate into the air at room temperature. VOCs contribute to the formation of smog and / or may themselves be toxic. Common sources include gasoline, alcohol, and the solvents used in paints.

SUMMARY

Alberta Environment has commissioned this report as a collaborative process to support airsheds in the development of management plans for PM and Ozone. The report reviews and evaluates leading practices in air quality management from jurisdictions around the world and airsheds can use this information to identify potential policy tool options that can be implemented to reduce PM and ozone within their airshed.

The report has two main deliverables that can be used by airshed stakeholders to identify potential policy tools and options that can be used to manage PM and ozone in Alberta. The first deliverable is a “long-list” of over 120 policy tools that extensively covers all economic sectors, types of regulatory and non-regulatory policy tools and major sources of emissions (Appendix A). The second deliverable is a “short-list” of policy tools for which detailed profiles have been prepared (Section 3). The detailed profiles examine the effectiveness, stakeholder responsibilities, and enforcement and administration requirements for 21 leading practices and includes an evaluation of how the policy tool could be implemented in Alberta.

1.0 INTRODUCTION

1.1 Background

Rising ozone levels around Edmonton, Calgary and Red Deer have triggered the management planning level of the Clean Air Strategic Alliance's (CASA) PM and Ozone Management Framework. Although ozone levels have not yet exceeded the Canada Wide Standards (CWS), stakeholders have received notification that levels have exceeded the planning trigger (i.e., 58 ppb) and that management plans to reduce ozone levels must be developed to ensure that the CWS are not exceeded in the future. Ozone management plans are needed for the Edmonton and Calgary Census Metropolitan Areas (CMAs), as well as areas included within the boundaries of the Fort Air Partnership (FA), West Central Airshed Society (WCAS) and the Parkland Airshed Management Zone (PAMZ). The framework calls for these plans to be developed by November 2008.

Alberta Environment has commissioned this report as a collaborative process to support airsheds in the development of management plans. Previous work on emission inventories and source apportionment has indicated that emission sources related to all sectors of the economy (e.g., transportation, residential, industrial, commercial / institutional, energy and agriculture) can contribute to high ozone and particulate levels. Large increases in industrial activity in several Alberta airsheds may also contribute to increased levels of PM and ozone.

1.2 Scope and Objectives

The Air Quality Management (AQM) Policy Tool Leading Practice project was initiated by Alberta Environment to assist in identifying policy tool options that could be used to manage particulate matter (PM) and ozone in Alberta. The purpose of the report is to review and evaluate leading practices from jurisdictions around the world to determine whether similar tools that are relevant to the social, economic and environmental conditions of Alberta could be adopted to manage PM and ozone within the impacted airsheds.

The scope of the report requires that leading practice AQM policy tools that can achieve PM and ozone emission reductions include actions that can be taken by all stakeholders involved in the airshed management process. This includes all levels of government (provincial, municipal, federal) as well as industry, non-governmental organizations and any other private stakeholders.

AQM policy tools are typically designed to achieve emission reductions within a specific sector of the economy. The AQM policy tools presented in this report have been organized into six economic sectors (transportation, industrial, residential, commercial / institutional, energy and agriculture) so that policy options are available to address potential emissions from each of these sectors.

AQM policy tools can be broadly categorized into regulatory and non-regulatory tools and further sub-categorized into specific policy tool instruments such as financial incentives, prescriptive standards and voluntary agreements. This report considers the full range of policy tools available in order to provide stakeholders with as many options as possible for air quality management.

The report has two main deliverables that can be used by airshed stakeholders to identify potential policy tools and options that can be used to manage PM and ozone in Alberta. The first deliverable is a “long-list” of over 120 policy tools that extensively covers all economic sectors, types of regulatory and non-regulatory policy tools and major sources of emissions. The long-list presented in Appendix A, is in essence a summary of the major available options. The brief summaries identify relevant examples of leading practices in other jurisdictions, the stakeholders that are typically responsible for implementation, and references and links to find out more information.

The second deliverable is a “short-list” of policy tools for which detailed profiles have been prepared. A total of 21 policy tool profiles were developed and are presented in Section 3. Each profile identifies the leading practices and how the tool has been implemented. Specific details on the effectiveness of the tool, stakeholder responsibilities, and enforcement and administration requirements are also included. In addition, an evaluation is provided of how the policy tool could be implemented in Alberta.

Airsheds can use this information to identify potential policy tool options that can be implemented to reduce PM and ozone within their airshed. While some of the regulatory policy tools will require the cooperation of many stakeholders and may need to be led by the provincial government, others may be implemented at the airshed level. It is suggested that airsheds review the long-list of policy options so that they are aware of the wide range of policy options that could be implemented. The review of the long-list could be conducted as part of a brainstorming exercise of what could be done to manage air quality.

The 21 short-list profiles can be used by airsheds to evaluate the advantages and weaknesses of the profiled policy tools and determine how the policy tool could be implemented in Alberta.

2.0 METHODOLOGY AND TECHNICAL APPROACH

2.1 Overview

A three-staged approach was used to identify potential AQM policy tools: a jurisdictional review; a literature review, and contact with specific jurisdictions.

Marbek identified and reviewed jurisdictions with leading best practices in the management of air quality. These jurisdictions included countries in the European Union (e.g., Netherlands, Germany, United Kingdom), Japan, Australia, United States (e.g., California, New Jersey, Washington) and Canada (e.g., British Columbia, Ontario).

Upon completion of the literature review, a “long-list” of leading practices was developed to comprehensively identify the widest breadth of policy tool options possible. From this long-list a “short-list” of policy tools was selected to be profiled in detail based on the application of a number of criteria that systematically analyzed and rated the most promising air quality management tools. Criteria were developed based on feedback provided by Alberta Environment and Airshed groups.

2.2 Sectors

The air quality management policy tools have been divided into six sectors of the economy: transportation, industrial, residential, commercial/institutional, energy and agriculture. The definitions provided below for each sector identify the emission sources that are included or excluded.

Industrial – The industrial sector includes all activities related to the production, processing and assembling of goods. Typically the industrial sector encompasses manufacturing, forestry, mining and construction. All industry activities related to primary energy production and electricity generation are covered in the energy sector.

Transportation - The transportation sector includes all activities that relate to on-road and off-road vehicles, irrespective of whether the transportation activity could be associated with the other economic sectors (e.g., commercial, residential, agriculture or industrial). Certain transportation types including aircraft and marine vessels have not been considered as these transportation modes are unlikely to be managed at an airshed level in Alberta. In addition to including policy tools that directly impact the level of emissions from vehicles, the transportation sector also includes policy tools that impact transportation demand and infrastructure. As a result, policy tools that impact land-use and have a significant impact on the transportation system have been included in this sector.

Residential – The residential sector includes all activities and equipment related to residential buildings including: space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. In addition, public product use and the use of small engines such as for lawn and garden maintenance have also been included. Electricity generation is considered under the energy sector.

Commercial/Institutional – The commercial/institutional sector includes non-manufacturing business establishments, government, schools, hospitals and public organizations. In addition commercial product use and the use of stationary engines related to commercial operations have been included.

Energy – The energy sector includes electricity generation and primary energy production. As a result, all industrial activities related to the production and upstream distribution of crude oil, bitumen and natural gas are covered in this sector.

Agriculture – The agriculture sector includes ozone precursor or particulate emission sources such as wind-blown soil erosion, manure waste management systems, burning of agricultural residues and fuel combustion for water pumping and space heating. Fuel combustion related to off-road vehicles such as tractors is included in the transportation sector.

2.3 Categorization of Air Quality Management Tools

For each sector, the air quality management tools have been disaggregated by the management categories identified and used by Alberta Environment in their policy development (i.e., AENV Management Categories) and by a number of policy tool sub-categories that cover the spectrum of tools that could be applied. Exhibit 2.1 indicates the high level organization of the category tools that are explored for each of the sectors. AENV management categories are colour coded so that they can be easily identified within this report.

2.4 Development of Long-List of AQM Policy Tools

The consultants generated a long-list of policy tools that included all of the policy tool categories for each of the sectors. This comprehensive list of tools can be consulted to identify potential tools for air quality management.

The long list of AQM policy tools is organized in a list format so that it can be scanned to identify relevant information on the type of policy tool, how the tool has been applied and where to find additional information. Exhibit 2.2 identifies the individual information fields that are provided for each of the long list policy tools.

Table 1 Policy Tool Categories

AENV Management Category	Policy Tool Sub-Categories
Market Based Instruments and Fiscal Mechanisms	Emissions Trading
	Financial Incentives
	Charges and Taxes
	Other Market Mechanisms
Regulatory Approaches	Prescriptive Standards
	Performance-based Standards
	Bans or Restrictions
	Regulatory Approvals and Permits
	Other Regulations
Negotiated Agreements	(no subcategories)
Voluntary Stewardship and Corporate Responsibility	House-in-Order
	Voluntary Agreements
Supportive Programming	Information Disclosure
	Promotion and Awareness
	Development of Codes of Practice and Tools
	Capacity Building

Table 2 Information Fields in the Long-List of AQM Policy Tools

Information Fields	Description
Economic Sector	The long-list is divided into six separate tables representing each of the economic sectors (transportation, industrial, residential, commercial / institutional, energy and agriculture).
AENV Management Category	The first column of the “long-list” identifies the relevant AENV management category.
Policy Tool Sub-Categories	The second column of the “long-list” identifies the relevant policy tool sub-category.
Potential Air Quality Management Policy Tool and Relevant Examples	The third column of the long-list identifies each of the AQM policy tools that were identified in the literature review. Underneath each of the AQM policy tools in the third column, specific relevant examples of the application of the AQM policy tool are provided in separate rows.
Typical Leading Implementation Stakeholder	The fourth column of the long-list identifies the jurisdiction or authority that typically is responsible for implementing the AQM policy tool. In many cases AQM policy tools can be implemented by different levels of government, industry, non-governmental organizations or other private stakeholders.
References and Links for more Information	The fifth column of the long-list provides links and references to find additional information on the specific examples of AQM policy tools that are indicated.

Over 120 individual policy tools were generated in the long-list. Exhibit 2.3 identifies the number of policy tools that were identified in each of the Economic Sectors.

Table 3 Breakdown of AQM Policy Tools in the Long-list by Economic Sector

Economic Sector	Number of Policy Tools Profiled
Industrial	20
Transportation	31
Residential	27
Commercial / Institutional	23
Energy	15
Agriculture	12
TOTAL	128

The long-list, divided into six separate tables for each economic sector, is presented in Appendix A.

2.5 Selection of AQM Policy Tools to Profile

To supplement the long list, the project has developed 21 profiles of the most interesting and relevant policy tool options. To develop a short-list of policy tools to profile it was necessary to generate a set of criteria against which policy tools could be systematically analyzed and selected. Criteria were developed in consultation with Alberta Environment and in consultation with Airshed groups at the Alberta Environment Airshed Workshop meeting held on Wednesday, October 3rd, 2007.

The following criteria were used in the selection of the short-list:

1. Consistency of the policy tools with the existing political and regulatory regime in Alberta.
2. Ability of the policy tools to achieve substantial emission reductions.
3. Cost-effectiveness and demonstrated success of policy tools to achieve emission reductions.
4. Innovativeness of policy tools including policy tools that are not already well understood and established in Alberta.
5. Timescale of the policy tools to achieve significant emission reductions.
6. Policy tools that apply to area sources that have not been sufficiently addressed in Alberta are favoured over policy tools for point sources that are better handled under current regulations.

Marbek Resource Consultants applied expert judgment to select the policy tools to profile in detail. Not all of the criteria were equally weighted. The first three criteria listed above: (1. consistency with regime 2. scale of reductions and 3. proven and cost effective) were weighted more heavily than the final three criteria.

In addition to considering these criteria, it was also important that the overall selection of the 21 policy tools represent a wide range of potential policy tool options. The potential list generated using the selection criteria was reviewed and adjusted to ensure that the final short-list met the following requirements.

1. All economic sectors should be represented in the final selection of the short-list.
2. A wide range of regulatory and non-regulatory policy options should be included.
3. Policy options that can be implemented by a wide range of stakeholders should be included (e.g., all levels of government, non-governmental organizations, industry and other stakeholders).
4. Policy tool options that can be used to manage PM and Ozone during episodic events and in the long term should both be considered. (Episodic events refer to specific meteorological conditions that can lead to high levels of air pollution for short-time periods. In many cases air quality is managed in this period by restricting certain emissions or activities that lead to emissions.)

Exhibit 2.4 identifies the number of policy tools selected to be profiled for each economic sector. Exhibit 2.4 identifies the number of policy tools selected to be profiled for each of the policy tool sub-categories.

Table 4 Breakdown of AQM Policy Tools Profiled by Economic Sector

Sector	Number of Policy Tools Profiled
Industrial	5
Transportation	6
Residential	4
Commercial / Institutional	2
Energy	2
Agriculture	2
TOTAL	21

Table 5 Breakdown of AQM Policy Tools Profiled by Policy Category

AENV Management Category	Number of Policy Tools Profiled
Market Based Instruments and Fiscal Mechanisms	7
Regulatory Approaches	6
Negotiated Agreements	1
Voluntary Stewardship and Corporate Responsibility	4
Supportive Programming	3

The short-list of policy tools and detailed profiles are presented in Section 3.

3.0 SHORT-LIST OF POLICY TOOLS

This section presents the AQM policy tools that were selected to be profiled. Exhibit 3.1 identifies each of the AQM policy tools selected. The individual profiles for each of these AQM policy tools follows, in the order they are presented in Exhibit 3.1.

Table 6 Short-List of AQM Policy Tools

Economic Sector	AENV Management Category	Potential Air Quality Management Policy Tool and Relevant Examples
Industry Sector	Market Based Instruments and Fiscal Mechanisms	Market mechanisms for emission trading
	Regulatory Approaches	Prescriptive standards to reduce emissions from industrial equipment and processes
	Negotiated Agreements	Negotiated agreements between governments and industry sectors to reduce emissions
	Voluntary Stewardship and Corporate Responsibility	House-In-Order agreements to reduce emissions from industrial facilities
	Supportive Programming	Provide training on methods to reduce emissions
Transportation Sector	Market Based Instruments and Fiscal Mechanisms	Financial incentives to increase the manufacturing and purchase of low emission vehicles
		Financial incentives to reduce emissions from existing vehicles
		Charges and taxes to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions
	Regulatory Approaches	Mandatory inspection and maintenance programs to reduce emissions from existing vehicles
		Other regulations to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions
Voluntary Stewardship and Corporate Responsibility	House-In-Order programs to reduce emissions through procurement and use of vehicles	
Residential Sector	Market Based Instruments and Fiscal Mechanisms	Financial incentives to encourage lower emission residential equipment
	Regulatory Approaches	Prescriptive standards to increase energy / resource use efficiency in residential buildings
		Performance standards for consumer products
Supportive Programming	Promotion and awareness of integrated home retrofit services	
Commercial / Institutional Sector	Market Based Instruments and Fiscal Mechanisms	Financial incentives to increase energy / resource use efficiency in commercial buildings
	Voluntary Stewardship and Corporate Responsibility	House-In-Order building performance standards
Energy Sector	Market Based Instruments and Fiscal Mechanisms	Financial incentives to encourage lower emission electricity generation
	Supportive Programming	Public information disclosure on emissions
Agriculture Sector	Regulatory Approaches	Ban or restriction to reduce agricultural sector emissions
	Voluntary Stewardship and Corporate Responsibility	Voluntary agreement to implement best management practices to reduce agricultural sector emissions

3.1 Industrial Policy Tool #1: Market Mechanisms for Emission Trading

<p>Description of Policy Tool</p>	<p>Emission Trading Systems fix the quantity of allowable emissions (i.e., allowances) within an airshed or region and then allow emissions to become a tradeable commodity such that emission reductions take place wherever abatement costs are lowest. Thus, in theory, pollution reduction is achieved at the lowest possible cost to society.</p> <p>There are many design elements that can vary for different emission trading systems including:</p> <ol style="list-style-type: none"> 1. Which firms are included in the system 2. How allowances are granted to participating firms (existing and new) 3. Whether Safety valves are provided to limit the maximum cost of purchasing an allowance 4. Whether banking of allowances is allowed from one year to the next 5. Whether offsets are permitted from emission sources not covered under the trading system 6. How the cap on emission allowances is tightened over time <p>Alberta Environment is currently investigating an emission trading system for the Fort Air Partnership Airshed that is expecting rapid future growth. This system would establish overall emission caps for NO_x and SO₂ for large industrial sources within the area, grandfather emission allowances to existing firms, allocate allowances to new firms and allow firms to achieve offsets from non-regulated sources within the nearby City of Edmonton.</p>
<p>Leading Jurisdictions</p>	<p>There are several examples of emission trading systems in the United States, Canada and Sweden that have been successfully implemented to reduce particulate and smog precursor air contaminants.</p> <p>In terms of leading practice we have selected to review the Illinois Emissions Reduction Market System (ERMS) that was designed to reduce overall VOC emissions in an area of Chicago that is non-attainment of federal ozone standards. Illinois was the first state to adopt a market based cap and trade system for VOC. ERMS was specifically developed to manage VOC during summertime periods when episodic events of high ozone levels are frequent.</p>
<p>Leading Practice Example</p>	<p>ILLINOIS EMISSION REDUCTION MARKET SYSTEM (ERMS)</p> <p>How the Tool Works</p> <p>Volatile Organic Compound (VOC) emissions come from a wide variety of industrial activities, from painting and printing to chemical manufacturing and even some types of food production.</p> <p>VOC emissions in Illinois are already controlled by technology-based rules, which are typically applicable year-round, irrespective of air quality conditions. In the late 1990's the State of Illinois was in non attainment of federally regulated ozone standards in an area around Chicago and was required to develop programs to reduce VOC emissions. Further reductions in emissions using such "command and control" measures were considered to be potentially very costly and would also have involved determining how each individual industry could reduce emissions even further. In response an Emission Reduction Market System (ERMS) was designed as an emission trading program to reduce overall VOC emissions in the Chicago NAA while allowing sources to best determine how to reduce</p>

their own emissions in the most cost-effective manner.

The Illinois Pollution Control Board adopted the Emission Reduction Market System (ERMS) as a rule in November 1997 and the rule appears in Title 35 of the Illinois Administrative Code. The ERMS program operates from May 1 through September 30, correlating with the time of the year when ozone formation is most significant in Illinois.

The program allows trading among participating sources in order to meet a reduced cap on their overall VOC emissions. Each participant is given a baseline allocation of emissions, called Allotment Trading Units (ATUs), according to historical emissions. Participating sources are those that have baseline or actual emissions of at least 10 tons during the season and are required to have a state Clean Air Permit. In addition any new participating sources must acquire all of their VOC allocations through trades or long-term transfer agreements.

The allocation of ATUs was set to correspond to an overall area-wide reduction of 12 percent with a few exceptions for firms that demonstrated that their sources complied with Maximum Achievable Control Technology (MACT) or Lowest Achievable Emission Rate (LAER). VOC emissions from space heaters, fuel combustion units and internal combustion engines are also exempted by the program.

ATUs that are allocated to firms have a limited life and expire at the end of two years if they are not utilized. Sources may either reduce their emissions by the use of emission controls or process changes, or they may buy ATUs from other sources to account for any emissions in excess of their initial allotment.

Approximately 20 percent of all ATUs were traded in 2006. In the extraordinary event that there are no ATUs available through the market, the ERMS establishes a safety net and price cap by the creation of the Alternative Compliance Market Account (ACMA). This is a reserve of ATUs managed by the Agency, whereby reductions in the mobile or area sectors can be converted to ATUs and purchased at a set cost.

Effectiveness

VOC emissions from the beginning of the program have been significantly below the annual allocation of emission allowances and allowance prices have been much lower than predicted. As a result trading has been limited and some allowances have expired unused as there hasn't been a scarcity of allowances. The average allowance price reported in 2005 was only \$14 per ATU and much lower than predicted allowance prices of \$1,000 estimated at the start of the program from abatement cost data.

Overall in 2006, sources in the ERMS program emitted 61.5 percent less VOC than their baselines would have allowed them to emit and 57.4 percent less than their actual ATU allotment.

It is likely that reductions were achieved well beyond the objectives of the program and at a much lower cost than other command and control regulations. It is also apparent that the initial baseline allocation was higher than necessary and additional emission reductions could have been achieved at a low cost.

Stakeholder Responsibilities

Participating stakeholders include all firms that are required to have a Clean Air Act Permit and have actual emissions of at least 10 tons of VOC during the season. Approximately 147 separate firms were included in the scheme in 2007. All of these firms must monitor and report their emissions annually to the program.

	<p>Stakeholders that are not direct participants may also register to hold a trading account to buy and sell VOC emissions on the exchange to retire these emissions. In some cases environmental groups have used this mechanism to achieve additional emission reductions.</p> <p>Enforcement and Administration</p> <p>Sources which fail to reduce their emissions or obtain the proper number of allowances are penalized if they do not hold the required allowances. Repeat offenders are penalized at a higher rate. This enforcement mechanism discourages non-compliance on the part of participating sources and provides the Illinois EPA with some certainty the VOC reductions will be achieved.</p> <p>The ERMS program has administrative costs for both the Illinois EPA (IEPA) and affected firms. The overall start-up costs were reported by the Council of State governments to be about \$2 million, with annual operating costs around \$360,000. Approximately 4–5 full-time equivalent employees have been required to develop and operate the program. Additionally there are administrative costs to the industry associated with submitting documentation such as seasonal emission reports and negotiating initial allocations.</p>
<p>Other Leading Practices</p>	<p>Ontario NO_x and SO₂ emission trading system</p> <p>Ontario implemented an emission trading system to cap nitrogen oxides (NO_x) and sulphur dioxide (SO₂) for 30 facilities in seven manufacturing sectors with the goal of reducing NO_x by 21% and SO₂ by 46% from 1990 levels.</p> <p>US EPA SO₂ Emission Trading System</p> <p>The United States implemented a cap and trade emission trading system for SO₂ under the framework of the Acid Rain Program of the 1990 Clean Air Act. The trading system has reduced emission by as much as 40% since 1980 at a lower cost than regulation of source-by-source controls. The cap and trade system covers over 1,900 different facilities in 49 states. It is estimated that in 2010, the Acid Rain Program's annual benefits will be approximately \$122 billion (2000\$), at an annual cost of about \$3 billion - a 40-to-1 benefit-to-cost ratio.</p>
<p>Implementation in Alberta</p>	<p>Emission trading of NO_x and SO₂ already exists in Alberta in the electricity generation sector and is being considered in the Fort Air Partnership Airshed. There are several important lessons from the ERMS program that should be considered in the design of any similar type emission trading systems in Alberta. These lessons include:</p> <ol style="list-style-type: none"> 1. It is important to have a measurement program in place quickly to establish an accurate baseline to assist in allocation. 2. Starting with a fixed quantity of allowable emissions would have avoided the apparent inflation of the baseline that occurred in the ERMS program. 3. It is desirable to have robust mechanisms in place to address the uncertainties of emission trading markets and to make midcourse corrections if for example emissions were over-allocated.
<p>Important References and Links</p>	<p>Illinois Emission Reduction Market System http://www.epa.state.il.us/air/erms/apr/2006/aprr-2006-full.pdf http://www.epa.state.il.us/air/erms/overview.html http://www.rff.org/Documents/RFF-DP-06-36.pdf</p> <p>US EPA SO₂ Emission Trading System http://www.epa.gov/airmarkets/presentations/docs/jemarpbenefitsarticle.pdf</p>

3.2 Industrial Policy Tool #2: Prescriptive Standards to Reduce Emissions from Industrial Equipment and Processes

<p>Description of Policy Tool</p>	<p>Prescriptive standards identify the type of emission control technology that must be used to reduce emissions. In most cases in Alberta there are already performance standards such as maximum emission limits for sources or facilities, or specific ambient air quality criteria that cannot be exceeded that control emissions from industrial sources.</p> <p>The advantage of prescriptive standards is that it is possible to require the Best Available Control Technology (BACT) or Best Available Technology (BAT) without identifying a level of emissions that is acceptable. A prescriptive standard would reduce emissions in cases where BACT or BAT were not already being used. This premise avoids the concept of polluting to an allowable limit and is in accordance with the Keeping Clean Areas Clean principle.</p>
<p>Leading Jurisdictions</p>	<p>The United States requires non-attainment zones for ozone to use Best Available Control Technology (BACT) to control emission sources. In Europe the European legislation requires Best Available Technology (BAT) for emission sources for 32 different industrial sectors.</p> <p>Prescriptive technology standards generally do not replace other performance based requirements, but rather supplement them. The European BAT standards are reviewed in detail to demonstrate how these types of prescriptive standards can work.</p>
<p>Leading Practice Example</p>	<p>EUROPEAN UNION INTEGRATED POLLUTION PREVENTION AND CONTROL DIRECTIVE: REQUIREMENT FOR BEST AVAILABLE TECHNIQUES (BAT)</p> <p>How the Tool Works</p> <p>In order to receive a permit, an industrial installation in the European Union must use Best Available Techniques (BAT) to control air pollution. BAT requirements are outlined in Article 16(2) of the European Union Pollution Prevention and Control Directive.</p> <p>The “Techniques” are defined as both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned. “Available techniques” refers to those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and availability to the operator. “Best Available Techniques” refers to the most effective in achieving a high level of protection of the environment as a whole.</p> <p>BAT prescriptive standards change with time, particularly in the light of technical advances, and regulatory authorities must monitor or be informed of such progress. The European Commission organizes an exchange of information between Member States and the industries concerning BAT developments and prepares a series of reference documents (BREFs) that provide a summary of BAT for each of 32 industries.</p> <p>BREF reference information must be taken into account by the permitting authority in each of the member states when determining permit conditions. By providing relevant information concerning best available techniques, these documents act as valuable tools to drive environmental performance. The BREFs that have been adopted, drafted or under development for the 32 industrial sectors are listed below in Exhibit 1.</p>

Exhibit 1: Status of BREFs for 32 Industrial Sectors in the European Union

Regulated Industrial Activities	Status of BREF
Pulp and Paper manufacture	Not Available
Iron and Steel production	Not Available
Cement and Lime production	Draft
Cooling Systems	Adopted
Chlor-Alkali manufacture	Adopted
Ferrous Metal processing	Adopted
Non-Ferrous Metal processes	Adopted
Glass manufacture	Not Available
Tanning of hides and skins	Adopted
Textile processing	Adopted
Monitoring systems	Adopted
Refineries	Adopted
Large Volume Organic Chemicals	Adopted
Smitheries and Foundries	Adopted
Intensive Livestock Farming	Adopted
Emissions from storage of bulk or dangerous materials	Adopted
Common waste water and waste gas treatment and management systems in the chemical sector	Adopted
Economic and cross media issues under IPPC	Adopted
Large Combustion Plant	Adopted
Large Volume Inorganic Chemicals - Ammonia, Acids & Fertilisers	Adopted
Large Volume Inorganic Chemicals - Solid & Others	Adopted
Slaughterhouses and Animal By-products	Adopted
Food, Drink and Milk processes	Adopted
Ceramics	Adopted
Management of Tailings and Waste-Rock in Mining Activities	Finalised
Surface treatment of metals	Adopted
Surface treatments using solvents	Adopted
Waste Incineration	Adopted
Waste Treatments	Adopted
Speciality inorganic chemicals	Adopted
Organic fine chemicals	Adopted
Polymers	Adopted
Energy Efficiency	Draft

The BAT selection requires consideration of many parameters such as: pollutant types and inlet concentrations; gas flow rate; presence of impurities; permissible exhaust concentration; safety; investment and operating cost; plant layout; and the availability of utilities. In some cases, combinations of techniques may be necessary for high inlet concentrations or less efficient techniques. Generic BAT to control particulate and ozone precursor emissions are identified in each of the BREFs. An example of BAT used in the Refinery Sector to control sulphur is provided in Exhibit 2.

Exhibit 2: Best Available Techniques for Sulphur Recovery Units (SRU) related to the Refinery Sector

1.	Apply a staged SRU, including tail gas treatment with a recovery efficiency of 99.5 % - 99.9 % (based on acid gas feed to the SRU). Range depends on cost effectiveness considerations. Those efficiencies ensure a SO ₂ concentration range in the flue gas after incineration of 2000 – 400 mg/Nm ³ .
2.	Have an SRU configuration with sufficient capacity for the H ₂ S feed to the unit. This may be achieved by having, for example, at least two parallel SRU's of sufficient total capacity satisfactorily to cover all normal operating scenarios, including the sourest crude feed slate expected to be processed on the site.
3.	Have enough SRU capacity to allow the scheduled maintenance activity to proceed every two years, without a significant increase of sulphur emissions.
4.	Have a utilisation factor of at least 96 %, including major planned turnaround maintenance.
5.	Use state-of-the-art control and monitoring systems. Use of a tail gas analyser linked to the process control system (feedback control) will aid optimum conversion during all plant operating conditions, including changes to sulphur throughput
6.	Use a good furnace burning-zone design and effective furnace temperature and oxygen control systems where sour water stripper off-gases are a feed stream, because the process must also be designed and operated to complete the destruction of ammonia.
7.	Apply alternative H ₂ S/SO ₂ recovery/removal techniques (e.g. iron chelating, solvent extraction, NaOH adsorption, molecular adsorption) in those installations where the H ₂ S production is small (< 2 t sulphur per day if incineration is acceptable). Those options have important cross-media effects such as waste generation and energy consumption.

Effectiveness

The large majority of European Union Member States indicate that the Reference Documents (BREFs) and generic BAT published by the Commission are taken into account when determining BAT for their industries. However, the application of BAT is not systematically addressed in all of the relevant national legislation.

Although a number of Member States stressed their limited practical experience in the implementation of the IPPC Directive over the reporting period, the general view among Member States is that this Directive is an effective tool in combating pollution from industrial installations, bringing a number of benefits, in particular as regards the integrated and preventive approach and the implementation of permit conditions based on BAT. Some Member States underlined that the implementation of the Directive has brought about administrative simplification and enhanced dialogue between competent authorities and operators. The BREFs published by the Commission are widely considered as useful tools for the determination and dissemination of BAT.

Stakeholder Responsibilities

Each of the European Union Member States ensures that the competent regulatory authorities follows or is informed of developments in BAT that is published by the Commission.

Each industrial sector BREF was prepared or is being prepared by the Information Exchange Forum (IEF), which consists of representatives from member states, industry and

	<p>environmental non-governmental organizations. The documents drafted by the European Commission are circulated to specific Technical Working Groups before being submitted to the Environment Directorate-General of the Commission and being further considered by the IEF.</p> <p>Enforcement and Administration</p> <p>The Member States are responsible for inspecting industrial installations and ensuring they comply with the BAT requirements identified in the Directive. An exchange of information on best available techniques is held regularly between the Commission, the Member States and the industries concerned. Reports on the implementation of the Directive are drawn up every three years.</p>
Other Leading Practices	<p>United States Environmental Protection Agency: BACT / LAER Clearinghouse</p> <p>The Clean Air Act prescribes several technology-based limitations affecting new or modified air pollution sources including: Best Available Control Technology (BACT); and Lowest Achievable Emission Rate (LAER). Major new or modified sources must install either BACT or LAER, both of which are determined on a case-by-case basis. In all cases, BACT or LAER must be at least as stringent as any applicable source performance standard. The BACT requirement, applies to emissions in areas that are in attainment with National Ambient Air Quality Standards (NAAQS). The LAER requirement applies to emissions that affect areas that are not in attainment with the NAAQS. While the specific criteria governing BACT or LAER varies, the general underlying approach for all such determinations is to require "best control" on all major new or modified sources. State and local air pollution control agencies have assumed primary responsibility for making BACT and LAER determinations and the BACT/LAER Clearinghouse was set up to assist them in making control technology determinations in a nationally consistent manner.</p>
Implementation in Alberta	<p>Alberta's permit process is to consider plant-wide emissions and through air dispersion modeling to determine the maximum ground level contaminant concentration. Emission limits on stacks from major sources at the facility are established based on the modeling and information on the stack characteristics. Emission limits may also reflect the capabilities of emission control technologies at the time of application or after major modifications but does not explicitly require best available emission controls or some other prescriptive technology standard.</p> <p>Alberta could consider applying requirements for industries to meet prescriptive standards similar to the European BAT or American BACT or LAER. The advantage of these standards is that it allows regulatory authorities to achieve maximum emission reductions that are potentially below permit level emissions that are based on compliance with air quality objectives. One major barrier is that establishing prescriptive technology standards for each industry and each type of emission source is an extremely time intensive stakeholder process and it may only be viable if regulations deferred to standards that have been set elsewhere, such as European BAT or US EPA BACT/LAER or if prescriptive standards are only developed for a few large industries.</p>
Important References and Links	<p>European Union Integrated Pollution Prevention and Control Directive: Requirement for BAT http://eippcb.jrc.es/pages/FActivities.htm</p> <p>United States Environmental Protection Agency: BACT/LAER Clearinghouse http://cfpub.epa.gov/rblc/htm/bl02.cfm http://www.arb.ca.gov/bact/bact.htm</p>

3.3 Industrial Policy Tool #3: Negotiated Agreements between Government and Industry to Reduce Emissions

<p>Description of Policy Tool</p>	<p>Negotiated agreements are contracts between the regulator and individual or groups of firms that have been reached through a process of consultation. Negotiated agreements include targets and timetables for action with defined rewards and penalties. While entering into the contract is voluntary, once the agreement has been made, the delivery of the result is no longer voluntary and sanctions may also be imposed in cases of non-compliance. Most regulatory authorities that use negotiated agreements, do so under the threat of tough regulations if an agreement cannot be achieved, and also with the implementation of conventional laws and regulations should industry fail to meet its commitments.</p> <p>Negotiated agreements offer a way for government and industry to take concrete steps toward pollution management while the details of regulations are still evolving. Such agreements give industry and communities a voice in determining specific pollution reduction targets and offer firms flexibility as to how to comply with targets.</p> <p>Negotiated agreements can offer numerous advantages to traditional command and control regulations. Typically negotiated agreements take less time to introduce, involve lower administrative costs, and offer greater flexibility to stakeholders on the choice of emission reduction targets and the methods to achieve reductions.</p>
<p>Leading Jurisdictions</p>	<p>Negotiated agreements have been used successfully in over 15 European Union countries to achieve environmental objectives such as reducing emissions of particulate and ozone. In the Netherlands, the government strongly encourages negotiated agreements, called covenants, and is the central instrument for reaching environmental goals set out in the Dutch National Environmental Policy Plan (NEPP). Over a hundred negotiated agreements have been closed since 1995, with approximately 80% of these addressing industrial pollution, and many have proven to be successful in achieving environmental goals. The success of negotiated agreements in the Netherlands has been attributed to the fact that guidelines concerning their use are flexible; however stringent policy control and enforcement mechanisms are in place should industry not meet its commitments. Robust and measurable objectives and clear rules for monitoring and reporting were also identified as critical factors.</p> <p>Additionally, Denmark, France and Belgium also have a long history of negotiated agreements, which have been implemented with various levels of success.</p> <p>According to the Organization for Economic Co-operation and Development (OECD), Australia and Canada have been identified as jurisdictions where negotiated agreements have been used poorly. This is largely due to the fact that negotiated agreements were used to re-package planned investment rather than deliver significant new action.</p>
<p>Leading Practice Example</p>	<p>NETHERLANDS NEGOTIATED AGREEMENT ON ENERGY EFFICIENCY IN INDUSTRY</p> <p>How the Tool Works</p> <p>The Netherlands has a long tradition of using negotiated agreements to achieve quantitative environmental goals. In the early nineties legally binding long term agreements (LTAs) were set up to cover 90% of industrial energy consumption in over</p>

30 different industrial sectors.
The first Dutch LTA scheme (LTA1) had quantitative targets to increase energy efficiency by 20% by the year 2000 (compared to 1989). This is equivalent to a 2 % per annum efficiency improvement in the period 1990-2000.

Each negotiated agreement with an industry sector is a contract under civil law signed by the government, individual companies and the trade association. The agreement is legally binding; and by agreeing to additional efforts industry gets facilitated access to environmental permits. The agreements explicitly include individual firm commitments and mandatory reporting at the firm level.

Recently the Netherlands has introduced a follow up to the first generation negotiated agreement on energy efficiency in industry: the Covenant on Benchmarking Energy Efficiency or LTA2, under which companies commit to achieve “best of class” energy efficiency with regards to process installations amongst comparable companies.

Exhibit 1 indicates the industrial sectors that have been included in the energy efficiency negotiated agreement.

Exhibit 1: Industrial Sectors that have entered into Negotiated Agreements on Energy Efficiency in the Netherlands

Asphalt industry	Electricity generation	Paper and cardboard industry
Breweries	Fine grained ceramics industry	Potato-processing industry
Building Ceramics industry	Glass industry	Refrigeration and Cold Storage
Calcium-Silicate Brick industry	Industrial washing	Soft drink industry
Carpet industry	Iron and steel industry	Sugar industry
Cement industry	Margarines, fats, oil production	Surface Treatment
Chemical industry	Meat processing	Tank storage and shipment
Cocoa industry	Non-ferrous metals	Textile industry
Coffee-roasting industry	Oil and gas production	Vegetable and fruit processing
Dairy industry	Oil refineries	Other large industries such as Philips Electronics

The LTA2 agreements are designed with the major goal of continuously improving energy efficiency. Under the LTA2 agreement the top energy efficiency level is specified as being at least 10% less energy efficient than the best performing installation. Companies commit to take action as soon as possible, but at the latest by 2012. Implementation of the LTA2 began in 2006 and benchmarked companies that are not yet among the best in the world, are required to implement all possible energy conservation measures that generate enough savings to cover the costs of borrowed capital. If a company is not in the world top class by 2008, it can choose between taking additional energy efficiency measures or finding trade offs through the Kyoto Mechanisms.

The LTA2 energy sector agreement covers energy efficiency and energy conservation systems, covering 85% of industrial use. The agreement is subject to independent verification. It also goes well beyond simple fuel efficiency measures and also looks at life cycle issues. For example, heavy bricks take more energy to produce, but if one considers the life cycle of these bricks, then they would save significant energy in buildings over the span of 30 years and indeed more so than the additional energy used

in producing them. Compliance with LTA2 will allow industry to be exempt from the carbon tax introduced in 1996.

Member companies that join the LTA2 agreements on energy efficiency must prepare an energy conservation plan and begin energy management within 2 years of joining. Companies must also conduct yearly monitoring. As part of services to the LTA2 agreements, the government provides advice on energy conservation plans and assistance on conducting research and identifying best practices.

Effectiveness

As a whole Dutch industries covered under the LTA1 covenants achieved the target of a 20% increase in energy efficiency from 1989 levels by the year 2000. Many smaller sectors could not achieve the target; however, the largest sector (the chemical industry) improved energy efficiency by more than 25%. The impact on particulate and ozone precursor emissions is unknown; however, as reductions are primarily driven by reduced fuel usage, there is very likely a corresponding decrease in particulate and ozone precursor emissions.

The next generation of long term agreements (LTA2) aims to increase energy efficiency so that Dutch industries are among the highest energy efficient industries in the world. Between the year 2000 and 2004, LTA2 had achieved average energy efficiency in the industries covered by 2% per year. It is anticipated that between 2005 and 2008 that the annual average increase in energy efficiency will be between 1% and 2%.

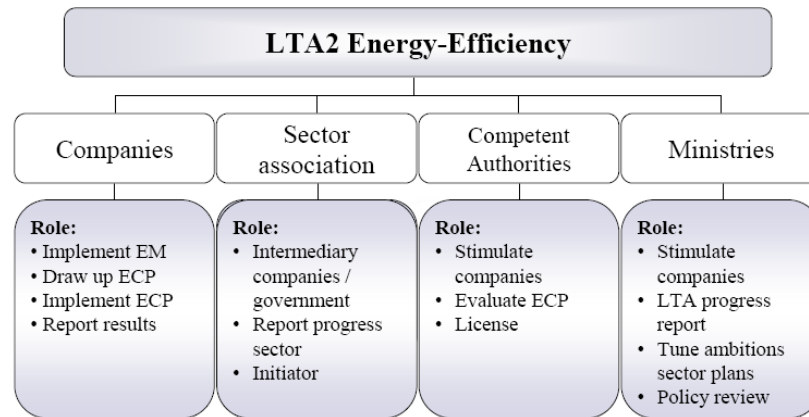
A study of the effectiveness of Dutch negotiated agreements indicated that there were several key factors that contributed to the success of these types of agreements including:

1. The agreement had concrete, quantitative goals with responsibilities assigned to stakeholders and it is obvious who is supposed to do what, when, and to what end.
2. Ample attention is made to monitoring, progress and evaluation throughout the process so that all parties can agree on what has been established.
3. All major disagreements must be solved during negotiations so that they don't later disrupt implementation.
4. Governments need to develop in parallel regulations to ensure compliance.
5. Negotiations work better when a sector association is able to speak for all of its members.

Stakeholder Responsibilities

Stakeholders in the LTA2 energy-efficiency negotiated agreements included companies, sector associations and regulatory authorities. The roles of each of these stakeholders are outlined in Exhibit 2.

Exhibit 2: Stakeholder Roles and Responsibilities



Enforcement and Administration

Non-compliance with the LTA2 agreement brings companies back under the standard operation permit system and companies are penalized through increased stringency of their operation’s license.

An analysis review of the negotiated agreements in the Netherlands indicated that industry commonly needs to have a clear motive for joining ‘voluntary’ negotiations and can be motivated by public opinion and the threat of government introducing tough regulations.

The transaction costs involved in the negotiation process before and after concluding negotiated agreements were found to be substantial in the Netherlands. However, costs to industry to implement measures were found to be less in comparison to similar regulatory requirements, due to the administrative savings that accompanied a reduced permitting burden.

Other Leading Practices

Denmark

In Denmark, more than 400 agreements have been made with companies, representing approximately 60 % of trade and industrial energy consumption. Negotiated agreements with energy intensive industry branches are binding and are connected to the CO₂ tax. Reductions in CO₂ emissions can often be correlated directly to reductions in particulate and ozone precursor emissions as these emissions usually decrease proportionally to the amount of fuel used.

The estimated CO₂ reduction in 2005 as a consequence of agreements over the period 1996-2000 is 6.3 % of total emissions and 2.7 % of the energy consumption of manufacturing industry.

European Union

European appliance manufacturers entered into negotiated agreements with the European Commission to set appliance energy efficiency targets. The manufacturers had indicated their strong opposition to regulatory approaches and preferred negotiated agreements that would give them more freedom in reaching energy efficiency targets. The agreement provided them flexibility on when to phase out low efficiency units and therefore optimized the process. The agreement also pre-empted the need to propose or introduce specific legislation for efficiency requirements for this equipment. An example of a negotiated agreement was the TVs and VCRs agreement signed in 1997 by

	<p>16 companies. Manufacturers agreed that the company sales-weighted average would be progressively reduced towards an energy efficiency target of 3 Watts by 2009. The target refers to the company sales-weighted TVs and VCRs stand-by consumption. During 2003, sale average power consumption of 2.21 W and 3.53 W was achieved for TVs and VCRs respectively.</p>
Implementation in Alberta	<p>Alberta has a tradition of decentralization, consensus-building and negotiation in decision-making that increases the chance that negotiated agreements can be used successfully to achieve emission reductions of particulate and ozone.</p> <p>The EnviroVista program in Alberta is an example of a negotiation process that contributes to enhancement of the environment (better air, water and land quality) through better emissions performance and continuous improvement from facilities. An “EnviroVista Champion” is a participating facility that commits to a Stewardship Agreement and receives a Modified Approval. The agreement and the modified approval combine to provide a greater level of environmental enhancement and protection and operational flexibility than is possible with a regulatory approval alone.</p>
Important References and Links	<p>Bressers, Prof.dr. J.T.A. and Bruijn de, Dr.ir. T.J.N.M. (2005) <i>Conditions for the success of negotiated agreements: Partnerships for environmental improvement in the Netherlands. Business strategy and the environment</i>, 14 (4). pp. 241-254.</p> <p>Voluntary Agreements on Energy efficiency in Industry in the Netherlands http://www.senternovem.nl/mmfiles/ta_secgen_tcm24-171838.pdf</p> <p><i>Are voluntary agreements an effective energy policy instrument? Insights and experiences from Europe.</i> Silvia Rezessy, Central European University, Paolo Bertoldi, European Commission DG JRC Agneta Persson, ÅF-Process A http://re.jrc.cec.eu.int/energyefficiency/pdf/publications/ACEEE%202005%20paper%2013%20final.pdf</p> <p>Price. L. April 2005. <i>Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World.</i> Ernest Orlando Lawrence Berkeley National Laboratory. LBNL-58138 http://ies.lbl.gov/iespubs/58138.pdf</p>

3.4 Industrial Policy Tool #4: House-in-Order Agreements to Reduce Emissions from Industrial Facilities

Description of Policy Tool	<p>Institutions and businesses may implement voluntary house-in-order agreements to reduce their in-house energy demand and consequently lower the amount of energy-generated emissions that they produced.</p>
Leading Jurisdictions	<p>Numerous federal and provincial government agencies and corporations have put in place in-house policies and programs to reduce energy use and their emissions from their industrial facilities.</p> <p>Energy management options implemented have included having their operational processes becoming ISO 14001 certified, designing new facilities to meet LEED standards, conducting energy audits and using renewable energy to service their energy needs.</p> <p>One of the most progressive corporations to voluntarily agree to reducing energy use and all types of emissions including air emissions is Interface Inc., a major carpet and upholstery manufacturer headquartered in Atlanta.</p>
Leading Practice Example	<p>INTERFACE INC: HOUSE-IN-ORDER PROGRAM</p> <p>How the Tool Works</p> <p>Interface Inc. is an international carpet and upholstery manufacturer with global manufacturing facilities and offices in more than 100 countries. The corporation has mandated to become a zero emissions producer of waste and emissions by the year 2020. Initiatives taken by the corporation with regards to facilities include:</p> <ul style="list-style-type: none"> • Adoption of ISO 14001 • Compiling and analyzing company wide sustainability metrics and activities, greenhouse gas emissions, toxic chemical inventories, etc. • Management and administration of sustainability metrics, such as QUEST for waste elimination, EcoMetrics for benchmarking and sharing best practices for facilities within the corporation, and Life Cycle Assessment (LCA) processes for Interface products. • Annual reporting of emissions from each facility and corporate-wide. • All new buildings to be LEED certified. The Interface showroom in Atlanta was the first LEED-CI (Commercial Interior) Platinum certified in the world. • Increasing the operation of facilities on renewable energy. Seven facilities are operated purely on renewable energy, while two facilities purchase their energy from renewable energy facilities. <p>Stakeholder Responsibilities</p> <p>Interface worked with its designers, facility managers and independent evaluation and certification programs to create a model and a set of metrics to measure their progress.</p>

	<p>Effectiveness</p> <p>Improving energy efficiency and conservation programs has reduced the total energy intensity at Interface’s carpet manufacturing facilities by 45% since 1996. Total renewable energy use has increased to encompass 16% of total energy use in 2006. No estimates have been conducted of the associated reductions in particulate and smog precursor emissions.</p> <p>Enforcement and Administration</p> <p>Interface created two programs, QUEST and EcoSense, to manage and measure their progress towards their 2020 goal of creating no negative impact on the earth. The QUEST waste reduction program identifies, measures and eliminates waste and emissions facilities and processes. The program encourages employees to contribute suggestions to improving the efficiency of the equipment and processes. Rather than hold each facility to generic guidelines, individual facilities can discover ways to reduce waste that are unique to them. The program was expanded to include non-production areas of the company, such as sales, marketing and human resources that previously had not been involved.</p> <p>In addition, Interface developed the EcoSense program to educate employees about sustainability and the company’s goals. It also provides employees with access to resources, such as additional training and workshops to meet the sustainability goal. To promote employee involvement, Interface awards “EcoSense Points” for the successful completion of activities that increase sustainability, which can be redeemed for employee appreciation events.</p>
<p>Other Leading Practices</p>	<ul style="list-style-type: none"> • The Canadian Standards Association has created a Greenhouse Gas Emission Registry that companies can register with to track and report on their emission reduction strategies. Companies have put in measures to reduce their energy use and energy-generated emissions. Currently 287 companies in Canada are registered by the voluntary program. • General Electric has created a target and measure to increase energy efficiency by 30% by 2008 in its facilities.
<p>Implementation in Alberta</p>	<p>Stakeholders in the airshed could encourage and challenge companies operating within the airshed to commit to voluntary agreements to reduce energy consumption, increase energy efficiency and reduce air pollution emissions from their facilities. An initial program may be as simple as offering educational resources and recognition programs and highlighting best practices.</p>
<p>Important References and Links</p>	<p>Interface Inc. Sustainability http://www.interfacesustainability.com/</p> <p>Canadian Standards Association GHG Emission Registry http://www.ghgregistries.ca/challenge/index_e.cfm</p> <p>General Electric Ecoimagination http://ge.ecomagination.com/site/index.html#vision/commitments</p>

3.5 Industrial Policy Tool #5: Provide Training on Methods to Reduce Emissions

Description of Policy Tool	<p>Training in energy management has been identified as a critical component to implementing energy efficiency projects within industry. While energy efficiency leads indirectly to air emission reductions, specific training to operate combustion equipment and air pollution control to reduce air emissions can also be provided.</p>
Leading Jurisdictions	<p>Energy management training in industry is actively supported in many countries, but few countries have developed qualifications and training programs that focus on achieving direct results through initiating projects. The European Union has recently established the European Energy Manager Qualification to provide training to industry professionals that can realize energy efficiency projects.</p>
Leading Practice Example	<p>EUROPEAN ENERGY MANAGER TRAINING</p> <p>How the Tool Works</p> <p>The European Union has developed a training program and qualification for European Energy Managers in collaboration with member state national institutions. The central objectives of the program are:</p> <ol style="list-style-type: none"> 1. The creation of an European Energy Manager Qualification. 2. The development of training modules based on real projects that use best-practice applications as case examples and, because of this, enables direct transfer into practice. 3. A continuous training program in each country in cooperation with national networks of training providers. 4. Nation-wide recognition of the training Qualification in four countries and the preparation of transfer to four additional countries. <p>The European Energy Manager training program is aimed at industry professionals (e.g., plant managers, production managers, energy representative, process engineer, operation technician, facility manager) that manage energy as part of their job function and have a responsibility for improving energy efficiency and reducing energy costs.</p> <p>Training courses are offered to industry professionals with the intent of providing practical experience into energy management and the latest European best practices. Participants also undertake a work based feasibility study as a practical project to achieve real energy savings at their own company and receive support materials and calculation tools.</p> <p>The content of the 12-day training course includes:</p> <ul style="list-style-type: none"> • Energy and emissions law and trading • Calculation of energy costs and project management • Energy data/load management • Energy from biomass and solar • Energy fundamentals • Heating • Process heat, steam, heat recovery • Cogeneration/CHP • Air conditioning • Refrigeration • Electrical engineering and electrical drives • Lighting

	<ul style="list-style-type: none"> • Compressed air • Energy in buildings <p>An extensive handbook was developed for the program which defines the complete European Energy Manager qualification concept and identifies the course material, training methodology, training material standards and test standards.</p> <p>Effectiveness</p> <p>In the first round of training offered in four countries, approximately 60 industry participants were trained. The large majority of course participants indicated that the course offered was of great value and had helped them achieve additional energy savings at their respective companies. Of the projects undertaken as part of the course work the average energy saving of each project was of 527 MWh/year, generating savings of an average of 22,553 £/year, and 357 ton/year of CO₂. It is expected that there would also be a significant reduction in particulate and smog precursor air emissions as a result of the initiatives.</p> <p>The success of the pilot program launched in 2002-2005 has resulted in a second phase expansion of the project from four countries to eight countries.</p> <p>Enforcement and Administration</p> <p>The European Energy Manager Qualification is formally recognized through national institutions in each of the member states. The courses are delivered by member states through these national institutions or through independent consulting agencies.</p> <p>The cost of the training course is primarily self funded through registration fees of approximately £ 2,600.00 per participant. The European Union contributed funding for the development of the training course.</p>
<p>Other Leading Practices</p>	<p>California Industrial Energy Efficiency Technology Outreach, Training, and Plant Assessment Program</p> <p>The California Energy Commission developed a training program in partnership with four major gas and electric utilities in Southern California (Pacific Gas and Electric Company, Southern California Edison, Southern California Gas Company, Sacramento Municipal Utility District, and the Los Angeles Department of Water and Power). The program delivered Best Practices workshops statewide for more than 1000 participants. Best Practice workshops were offered for basic end-user, advanced, and specialist qualification training in compressed air, steam, process heat, motors, pumps, and fan systems.</p> <p>The project engaged the most energy-intensive industries to partner with the CEC and its allies to develop "action plans" and conduct system and plant energy assessments. Program staff provided training to plant personnel and conducted assessments at host industrial sites. Program staff also provided technical support for implementing system assessment recommendations to achieve an energy saving goal from training and assessments of 82 billion Btu (87,000 GJ). Emission reduction estimates were not generated for the program; however, a reduction in electricity use of 87,000 GJ in California would result in a reduction of over 7 tonnes of NO_x per year.</p> <p>ENERGY STAR Training</p> <p>The US Environmental Protection Agency offers free on-line ENERGY STAR training to help businesses improve their energy performance. The advantage of the on-line training is that there is no travel time and other costs to the organization. The training for industry representatives includes guidance on completing a technical opportunities assessment and</p>

	developing plant Energy Performance Indicators (i.e., external benchmark for comparing plant performance to that of the industry). Over 470 U.S. manufacturing companies from diverse industries participate in the voluntary ENERGY STAR program.
Implementation in Alberta	Industry training programs aimed at encouraging energy efficiency and reducing emissions of particulate and smog precursors could be developed in collaboration with industry associations and energy utilities.
Important References and Links	<p>European Energy Manager Training http://www.european-energymanager.net/ShowArea.act?KEY=416 http://www.energyinst.org.uk/energycourses/euremflyer.pdf http://www.energyagency.at/projekte/audit.htm</p> <p>California Industrial Energy Efficiency Technology Outreach, Training, and Plant Assessment Program http://www.eere.energy.gov/state_energy_program/project_detail.cfm/sp_id=805</p> <p>Danish Energy Labelling in Buildings Scheme http://www.eva.ac.at/publ/pdf/forum_experience_dk.pdf</p> <p>ENERGY STAR Training http://www.energystar.gov/index.cfm?c=business.bus_internet_presentations</p>

3.6 Transportation Policy Tool #1: Financial Incentives to Increase the Manufacturing and Purchase of Low Emission Vehicles

<p>Description of Policy Tool</p>	<p>Financial incentives can bolster the economic case for choosing a vehicle with better fuel efficiency that consequently produces lower emissions. Manufacturers will also supply more low emission vehicles for purchase, if price signals are given that will promote demand for the purchase of low emission vehicles. Furthermore, consumer demand is based on vehicle ownership costs, variable operational costs (fuel, maintenance) and perceived added value (quality, status).</p> <p>The most common financial incentives to increase the manufacturing and purchasing of low emission vehicles are purchase rebates and access to infrastructure at reduced cost (e.g., discounted parking).</p>
<p>Leading Jurisdictions</p>	<p>A number of Canadian and American jurisdictions, at both the federal and provincial/state level, offer rebates for the purchase of low emission vehicles. At a local level, airsheds could introduce financial incentives that provide free or discounted parking to low emission vehicles.</p>
<p>Leading Practice Example</p>	<p>CALIFORNIA CLEAN AIR STICKER PROGRAM</p> <p>The Clean Air Sticker program was enacted in September 2004 by a state bill and launched in August 2005. The bill allows the Department of Motor Vehicles to sell “Clean Air Stickers” to owners of low emission vehicles in California. The stickers allow drivers of low emission vehicles specific financial incentives and privileges.</p> <p>In terms of financial incentives, drivers are provided free parking in the City of Los Angeles, preferential free parking spaces at Los Angeles International Airport, and free access on all toll corridors in the City of San Francisco.</p> <p>In addition to financial incentives the sticker program also allows drivers to travel on all state HOV lanes as a single occupant. Allowing drivers of low emission vehicles access to HOV lanes helps them to avoid congestion and reduce travel time.</p> <p>New vehicles that meet California's super ultra-low emission vehicle (SULEV) standard for exhaust emissions and the federal inherently low-emission vehicle (ILEV) evaporative emission standard are eligible for a Clean Air Sticker. In addition, new hybrid vehicles or alternative fuel vehicles that meet California's advanced technology partial zero-emission vehicle (AT PZEV) standard for criteria pollutant emissions and have a 45 miles per gallon or greater fuel economy highway rating are also eligible.</p> <p>The program has been limited to a total of 85,000 Clean Air Stickers that expire in 2011, and all of the Clean Air Stickers were purchased within a year of initiating the program. Along with an \$8 fee, drivers submit their applications to the Department of Motor Vehicles for review and approval and the department then issues the decals on a first-come, first-served basis.</p> <p>Stakeholder Responsibilities</p> <p>The Department of Motor Vehicles administers the Clean Air Sticker program.</p>

	<p>Effectiveness</p> <p>No estimates have been generated on the impact of the program on the purchase of new low emission vehicles. The very high response to the program clearly indicates that the free parking financial incentive and being able to travel in HOV lanes was highly valued.</p> <p>Enforcement and Administration</p> <p>The Clean Air Sticker is a self-funded program. All administration costs are recovered from fees charged for issuing the stickers. There was no increase in enforcement costs with the program as compared to a business-as-usual scheme.</p>
<p>Other Leading Practices</p>	<ul style="list-style-type: none"> • The City of Kelowna, British Columbia offers owners of hybrid vehicles and other low emission vehicles an “ECOPASS”, which entitles them to free parking anywhere in the city. • The Government of Canada offers a rebate up to \$2,000 on hybrid and fuel efficient vehicles. • The Government of Ontario offers a partial rebate on the provincial sales tax on the purchase of a hybrid.
<p>Implementation in Alberta</p>	<p>The Government of Alberta could offer a partial rebate on the provincial sales tax for hybrid and low emission vehicles to provide a financial incentive for drivers to purchase these vehicles. Additionally, various stakeholders could offer free and/or discounted parking for low emission vehicles.</p>
<p>Important References and Links</p>	<p>California Air Resource Board AB2628 Eligible Vehicles - Single Occupant Carpool Lane Stickers http://www.arb.ca.gov/msprog/carpool/carpool.htm</p> <p>California Department of Motor Vehicles http://www.dmv.ca.gov/vr/decals.htm</p> <p>City of Los Angeles http://www.lacity.org/LADOT/FreePark.htm</p> <p>City of Kelowna, British Columbia http://www.kelowna.ca/CM/Page369.aspx</p> <p>Government of Canada’s ecoAUTO Rebate http://www.tc.gc.ca/programs/environment/ecotransport/ecoauto.htm</p> <p>Government of Ontario’s Hybrid Tax Rebate http://www.rev.gov.on.ca/english/refund/vpaf/</p>

3.7 Transportation Policy Tool #2: Financial Incentives to Reduce Emissions from Existing Vehicles

<p>Description of Policy Tool</p>	<p>The purpose of financial incentives targeted at existing vehicles is to increase the uptake of low emission technology or remove heavy-emitting vehicles in the current fleet. The initial high cost of the technology or of the purchase of a new vehicle acts as a barrier to uptake. For instance, a financial incentive for heavy vehicles to install diesel oxidation catalysts that remove particulate from the exhaust makes the new technology more economically competitive.</p>
<p>Leading Jurisdictions</p>	<p>The United States has aggressively promoted financial incentives for the uptake of idling reduction technology for heavy-duty vehicles as part of their strategy to increase productivity in their trucking industry through fuel efficiency. Increasing fuel efficiency and reducing vehicle emissions are complementary actions. State initiatives can receive federal funding for their programs, such as the San Joaquin Valley Air Pollution Control District's heavy-duty engine anti-idling reduction technology incentive program.</p> <p>Additionally, programs that offer incentives for retrofitting heavy duty vehicles with Diesel Oxidation Catalysts (a type of muffler that uses a chemical process to break down pollutants in engine exhaust) or particulate filters are common in many non-attainment zones for ozone and particulate in the United States. Several retrofit programs using Diesel Oxidation Catalysts have also been conducted in Canada.</p> <p>Furthermore, many jurisdictions also offer financial incentives for vehicle owners to scrap older vehicles that cannot pass emissions testing programs or that statistically would have high emissions due to their age or disrepair.</p>
<p>Leading Practice Example</p>	<p>SAN JOAQUIN AIR DISTRICT HEAVY DUTY ENGINE IDLE REDUCTION INCENTIVE PROGRAM</p> <p>How the Tool Works</p> <p>The San Joaquin Valley Air Pollution Control District (SJVAPCD) created an incentive fund to promote the uptake of heavy-duty engine idling reduction technology, such as auxiliary power units. Auxiliary power units provide power to heat and cool truck cabs, as well as to operate required devices without running the truck's engine. As the average truck idles up to 2,200 hours per year, allowing the trucks to be able to shut off their engines saves fuel and reduces emissions.</p> <p>The amount of the incentive provided by the SJVAPCD is based on the estimated amount of pounds of emissions reduced. To receive the incentive owners are required to supply annual reports for five years to the SJVAPCD stating the number of vehicle miles travelled, fuel consumed and any major vehicle maintenance problems experienced in the year. This would allow the SJVAPCD to calculate the emission savings of this program.</p> <p>To further support the uptake of auxiliary power units, California has enacted legislation under the US Energy Act of 1992 that will allow drivers to exclude the weight of the auxiliary power unit from their payload weight calculation. Since an auxiliary power unit can weigh up to 400 pounds, not including it in the payload calculation allows the driver to carry the same load and is an economically neutral measure.</p>

	<p>Stakeholder Responsibilities</p> <p>The staff of the SJVAPCD administers the program and has the authority to determine the amount of the incentive. Those who receive an incentive are required to record and annually report on their vehicle travel, fuel consumption and vehicle maintenance.</p> <p>Effectiveness</p> <p>The emission reductions from the program have as of yet not been quantified. However, auxiliary power units are expected to increase fuel efficiency by 8% and reduce idling emissions.</p> <p>Enforcement and Administration</p> <p>The program is enforced through legal contracts signed between the SJVAPCD and the applicant. The contract states that the applicant must provide specific performance criteria and access to insurance information so that the SJVAPCD can perform a thorough audit.</p>
<p>Other Leading Practices</p>	<ul style="list-style-type: none"> • The City of Kelowna’s Cash for Clunkers program is a trade-in program for old, high-emitting vehicles in return for financial incentives such as \$750 towards the purchase of a new vehicle or a two year transit pass. • Metro Vancouver’s Scrap-It program allows vehicles that haven’t passed the emissions testing program to be traded in. In return the owners can receive \$1000 for the purchase of a new hybrid vehicle, free transit passes and/or free bicycles. • The California Air Resource Board In-Use Diesel Retrofit Program is a program to reduce particulate emissions. The Plan emphasizes retrofit and in-use controls for existing diesel engines because of their long lifespan. As part of the plan, a financial incentive program was run to retrofit old school buses with diesel particulate filters.
<p>Implementation in Alberta</p>	<p>Since the number of heavy-duty vehicle kilometres travelled is forecasted to steadily increase with the growth of the economy, emissions from this sector are expected to grow. Providing financial incentives to encourage the uptake of anti-idling technology in Alberta could be implemented by the Government of Alberta through a rapid tax write-off scheme. Additionally, the Government of Alberta could support the re-instatement of the truck idling reduction technology rebate that was granted by Natural Resources Canada and also for the harmonization of payload regulations between the provinces.</p> <p>Municipalities in the targeted airsheds could support voluntary trade-in incentive programs through advertising and financial support.</p>
<p>Important References and Links</p>	<p>San Joaquin Air District Heavy Duty Engine Idle Reduction Incentive Program http://www.valleyair.org/transportation/heavydutyidx.htm http://www.eere.energy.gov/afdc/vehicles/idle_reduction_laws_federal.html</p> <p>City of Kelowna’s Cash for Clunkers program http://www.city.kelowna.bc.ca/CM/Page464.aspx</p> <p>Metro Vancouver’s Scrap-It program http://www.scrapit.ca/incentive_choices.htm</p> <p>Fraser Valley Regional District Diesel School Bus Retrofit Pilot Project http://www.pyr.ec.gc.ca/airshed/documents/DOCFinalReport.pdf</p>

3.8 Transportation Policy Tool #3: Charges and Taxes to Encourage Modal Shift and Transportation Demand Management (TDM) that Reduces Emissions

Description of Policy Tool	<p>Charges and taxes are used to increase the cost of single-occupancy vehicle travel and make lower emission travel options, such as public transit and active transportation, more economically competitive. Examples of charges and taxes are increasing parking prices, congestion charges on expressways or downtown areas, and registration charges or insurance rates based on vehicle kilometres travelled.</p>
Leading Jurisdictions	<p>A number of cities in Europe, such as London UK, Stockholm, Sweden and Oslo, Norway have introduced congestion charging into their city centres. The success of London's congestion charging program has encouraged many cities in the United Kingdom and the United States to evaluate a similar system for their cities.</p>
Leading Practice Example	<p>CITY OF LONDON CONGESTION CHARGING PROGRAM</p> <p>How The Tool Works</p> <p>The City of London introduced a fee in February 2003, for driving private automobiles into central London during weekdays, as a way to reduce traffic congestion and raise revenue for public transportation improvements. Congestion pricing is a demand management strategy implemented on existing roadways to both reduce traffic congestion and encourage public transit ridership. Charging drivers a fee for the use of specific roadways is a method to reduce demand on the most congested streets and at the same time make traffic flow efficiently for the remaining car traffic and for public transportation.</p> <p>Vehicles that enter the congestion charging zone are required to pay a flat fee of £8, with the exception of motorcycles, licensed taxis, vehicles used by disabled people, buses, emergency vehicles and alternative fuel vehicles. Area residents receive a 90% discount for their vehicles. The charging area is indicated by roadside signs and symbols painted on the roads. A network of video cameras records the license plate numbers of vehicles and matches it with the paid list.</p> <p>Payments can be made at select retail outlets, at payment machines, by internet or by cellular telephone messaging and weekly, monthly and annual passes are available. Owners of vehicles that have not paid as required are sent a £80 fine, which is reduced to £40 if paid in two weeks or increased to £120 if not paid after a month. A city bylaw states that all net revenues must be spent on improving public transit infrastructure. A five-year monitoring program was established to evaluate the transport, economic, social and environmental impacts of congestion charging.</p> <p>Stakeholder Responsibilities</p> <p>Transport for London is a functional body of the Greater London Authority, with the responsibility of managing transport services in the City of London and implementing the Mayor of London's Transport Strategy. This strategy includes the congestion charging scheme.</p> <p>Effectiveness</p> <p>Approximately 110,000 motorists enter and pay the charge daily. The system is considered effective and has reduced total emissions of NO_x and PM₁₀ by approximately 12%. Automobile traffic declined by 20% and the public transit ridership increased by 15%. Traffic speeds within the zone have increased (from 13 km/hr to 17 km/hr), peak period congestion delays decreased by 30% and bus congestion delays declined by 50%. Taxi</p>

	<p>travel costs declined by 20-40% due to reduced delays and taxi and bus productivity (riders per day) increased. Motorcycle, moped and bicycle travel have increased. The success of the program has allowed for the area of coverage to be increased. In 2007, the congestion charging zone was extended to include boroughs west of the original central charging zone.</p> <p>Currently, Transport for London is undertaking consultations to change the fee structure to correspond to the vehicle's carbon dioxide emissions – high emission vehicles would pay more; lower emission vehicles would pay less. The proposed fee structure is £25 for high emission vehicles (engine size greater than 3,000 cc), £8 for moderate emission vehicles (engine size up to and including 3,000 cc) and a 100% discount for vehicles that meet Euro 4 vehicle emission standards¹ for air quality.</p> <p>In 2008, the City of London is introducing a “Low Emission Zone” which will encompass most of Greater London. The aim of the low emission zone is to improve air quality by deterring heavy-duty vehicles with higher emissions from driving in the city. Operators of heavy-duty vehicles that do not meet emission level standards will be charged a substantial daily fee to enter and operate within the Low Emission Zone.</p> <p>Enforcement and Administration</p> <p>Transport for London spends about half of the program's revenues on overhead costs such as project development, equipment and operations. The annual operating costs (including start-up fees) are estimated to be £100 million (2001 £). Non-payment rates were high during the initial period of the program, due to general confusion and errors, but the rates declined as users and operators gained more experience.</p>
<p>Other Leading Practices</p>	<ul style="list-style-type: none"> • San Francisco's Parking Tax applies to the rental of all non-residential parking spaces in the city. The tax is 25% of the rent charged for the occupancy of the parking space and is intended to discourage single occupancy vehicle commuters and increase public transit ridership. • Norwich Union's Pay As You Drive automobile insurance charges drivers by the number of kilometres driven, creating a financial incentive to drive less.
<p>Implementation in Alberta</p>	<p>Charges and taxes to encourage modal shift and transportation demand management can be effectively implemented at the airshed and municipal level in Alberta. While in general there is substantial public opposition to charges and taxes, by paying careful attention to recycling revenue to decrease costs to taxpayers in other ways, charges and taxes can gain public acceptance.</p> <p>Lessons from the London congestion charging program indicate that public scepticism was overcome by properly communicating the widely dispersed benefits of increased time-savings due to lower congestion, the considerable enhancement and reinvestment into public transit systems, as well as decreased air pollution and noise. Businesses that were originally opposed to the plan have since indicated that they have had a net positive benefit from implementation. In addition, the majority of vehicles entering the charging zone were driven by people who did not live (or vote) in the charging zone areas, and with residents receiving a 90% discount and all of the revenue being kept by the city, there was a powerful incentive for the charge.</p>

¹ The Euro 4 Emission Standard for diesel vehicles: 0.5g/km CO, 0.30 g/km HC+NOx, 0.25 g/km NOx, 0.025 g/km PM; for gasoline vehicles: 1.0 g/km CO, 0.1 g/km HC, 0.08 g/km NOx.

Important References and Links	<p>Transport for London Congestion Charging http://www.cclondon.com/</p> <p>Central London Congestion Charging, Fifth Annual Monitoring Report. Transport for London http://www.tfl.gov.uk/assets/downloads/fifth-annual-impacts-monitoring-report-2007-07-07.pdf</p> <p>San Francisco's Office of the Treasurer and Tax Collector - Parking Tax http://www.sfgov.org/site/treasurer_page.asp?id=57647</p> <p>Norwich Union's Pay As You Drive Insurance http://www.norwichunion.com/pay-as-you-drive/index.htm</p>
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3.9 Transportation Policy Tool #4: Mandatory Inspection and Maintenance Programs to Reduce Emissions from Existing Vehicles

<p>Description of Policy Tool</p>	<p>Vehicle inspection and maintenance programs (I/M) help improve air quality by identifying high-emitting vehicles in need of repair and requiring them to be fixed as a prerequisite to obtain the renewal of their vehicle registration.</p> <p>Inspection and maintenance programs can be designed to target light duty vehicles (passenger vehicles) and heavy duty vehicles (trucks). Often new vehicles are exempted from testing. Typically I/M programs require vehicle owners to bring their vehicles to a testing facility annually or biannually for testing. Tailpipe emissions are tested for concentrations of different air pollutants directly and indirectly related to particulate and ozone precursors.</p>
<p>Leading Jurisdictions</p>	<p>Inspection and maintenance programs are used in many jurisdictions at the federal and municipal levels in European cities and at the State level in the United States to reduce emissions from existing vehicles. The US EPA oversees many inspection and maintenance programs as part of state implementation plans under the Clean Air Act. In Canada, the Government of Ontario administers the Drive Clean Program and the regional government of Metro Vancouver administers the AirCare program.</p>
<p>Leading Practice Example</p>	<p>METRO VANCOUVER AIRCARE PROGRAM</p> <p>How the Tool Works</p> <p>AirCare is a self-funded, mandatory inspection and maintenance program for light duty vehicles (weigh less than 5,000 kg) that are required to meet emissions standards as a condition of vehicle registration or transfer of ownership (resale). The program was implemented in 1992 to improve the quality of the air in the Lower Fraser Valley. According to the 1990 emissions inventory, light-duty motor vehicles were estimated to account for 90% of the carbon monoxide, 35% of the oxides of nitrogen, and 43% of the volatile organic compounds released annually into the Lower Fraser Valley air shed. Thus, a vehicle emissions inspection and maintenance program was considered to be one of the most cost-effective approaches to reducing smog-forming pollutants in the region.</p> <p>The AirCare program was designed according to a centralized, contractor-operated model. A private company, Ebco-Hamilton Partners (now named Envirotest Canada), was contracted to build, staff and operate 12 inspection centres, located strategically throughout the region, with the capacity to perform up to 1.2 million inspections per year. A total of 42 lanes, each with identical testing equipment and lane operating software, were provided. The testing process was automated, with all the test data being transmitted electronically to a central database. The objective was to provide consistent and accurate tests, independently of the automotive repair sector. Since the inspection contractor would have no interest in the outcome of the inspection, the AirCare program would avoid the potential for conflict of interest that occurs in decentralized programs, where the person that does the test is the same one that repairs the vehicle if it fails. By separating the two functions, the testing contractor was able to focus on delivering quality inspections, leaving the repair industry to concentrate only on fixing vehicles with emission related problems.</p> <p>Vehicles that fail an inspection are required to repair (restore) their emissions to normal levels. Vehicle owners may limit the expense of repairs up to a limit that can vary between \$300 and \$600 depending on the age of the vehicle. The AirCare program was designed to</p>

include a certified repair industry, consisting of repair shops and repair technicians that meet program qualifications. Vehicles repaired by certified facilities are eligible for a conditional pass on re-inspection even if they fail to meet the standards. This allows the owner to re-license the vehicle for up to one year.

Stakeholder Responsibilities

The AirCare program was mandated under the Greater Vancouver Regional District’s Air Quality Management Plan. Under the *British Columbia Environment Management Act*, Metro Vancouver is responsible for managing the region’s air quality.

Effectiveness

Since its inception, AirCare has identified over 600,000 vehicles that appeared to be excess emitters and approximately 98% of these vehicles were either repaired or removed from use. In the year 2005 the program has reported reductions in annual emissions of nitrogen oxides (NOx) by 11%, Volatile Organic Compounds by 25% and carbon monoxide (CO) by 24%, when compared to a baseline without the program in place. Currently, there are 1.2 million vehicles in the AirCare program.

Repairs to failing vehicles appear to be effective as over 80% of the vehicles that failed subsequently passed a re-inspection. Exhibit 1 identifies the emission benefits of repairs performed in 2003 and 2004.

Exhibit 1: Emission Benefits of Repairs in 2003 and 2004

Vehicle Type	Age Group	HC	NO _x
Light Duty Vehicle	≥ 2001	71%	96%
	92-97	68%	52%
Heavy Duty Vehicle	≥ 1992	68%	26%

Note: The percentage in the table refers to the average emission reduction of repaired vehicles compared to their initial emission test. Hydrocarbon (HC) is directly related to particulate emissions.

Enforcement and Administration

The I/M program is completely self-funded through test fees that are paid by vehicle owners. At the time of vehicle registration, vehicle owners must present evidence that they have passed the required emissions test. Test fees were actually reduced recently to offset the accumulation of greater revenues that occurred due to higher than projected test volumes. There is no additional burden to administer the program.

No instances of AirCare inspection fraud, in which the inspector and motorist collude to get a vehicle to pass program requirements by falsifying test results, have been documented and this does not appear to be a compliance problem.

Other Leading Examples

Ontario’s Drive Clean is a mandatory inspection and maintenance program for both light and non-diesel heavy duty vehicles that are required to meet emissions standards as a condition of vehicle registration or transfer of ownership (resale). The self-funded program was introduced in Southern Ontario in response to the rising health effects and their costs attributed to air pollution. It tests the tailpipe emissions of nitrogen oxides (NOx), hydrocarbons (HC) including volatile organic compounds, and carbon monoxide (CO).

The Drive Clean program began testing vehicles in the Windsor to Toronto corridor in 1999, and the vehicle area testing was later expanded to include the area from Toronto to Peterborough in 2001 and finally to Ottawa in 2002. Thus, all vehicles in the identified

	<p>“smog corridor” are included in the program. For the first four years, Drive Clean has reduced smog-causing emissions by more than 81,200 tonnes.</p> <p>The US EPA also provides a clearinghouse of information on best practices for the design of inspection and maintenance programs. This reference is provided in the references and links sections.</p>
Implementation in Alberta	<p>The Government of Alberta could amend the <i>Traffic Safety Act, Vehicle Inspection Regulations</i> to mandate inspection and maintenance programs. These programs could be put into place to only affect specific jurisdictions and vehicles that are contained within the airsheds of concern. This approach has been successful in Ontario where only urban regions that had problems with air quality were included in the program.</p>
Important References and Links	<p>Metro Vancouver’s AirCare Program www.aircare.ca</p> <p>Ontario’s Drive Clean Program www.driveclean.com</p> <p>EPA Inspection and Maintenance Programs Best Practices http://www.epa.gov/oms/im.htm</p> <p>EPA Inspection and Maintenance – State Programs http://www.epa.gov/otaq/epg/statepgs.htm</p>

3.10 Transportation Policy Tool #5: Other Regulations to Encourage Modal Shift and Transportation Demand Management (TDM) that Reduces Emissions

Description of Policy Tool	<p>Amending and/or developing zoning by-laws to encourage and permit mixed-use, high density communities promotes non-vehicular travel by allowing public transportation systems to work more efficiently, increasing the convenience of active transportation travel and resulting in a reduced emissions of particulate and ozone precursors.</p>
Leading Jurisdictions	<p>Many American and European cities, such as Austin Texas, Portland Oregon and Montpelier France, have enacted various types of zoning bylaws to support lower emission transportation options and urban development.</p>
Leading Practice Example	<p>CITY OF AUSTIN, SMART GROWTH INITIATIVE</p> <p>How the Tool Works</p> <p>Rapid growth in population, employment, pollution and land area affected by development pushed the City of Austin to enact a smart growth initiative in 1997. The focus of the initiative was to increase development and density in areas where public transit was available, and to relieve development pressures on areas that needed to be protected.</p> <p>The City of Austin was divided into two primary areas by zoning changes; a “Desired Development Zone” and the “Drinking Water Protection Zone” to indicate where the City wanted to grow. In the Desired Development Zone, zoning bylaws identified areas as either transit-oriented development zoning or traditional neighbourhood development zoning.</p> <p><i>Transit-Oriented Development Zoning</i></p> <p>The goal of transit-oriented development zoning was to support the existing public transit infrastructure and to promote pedestrian-oriented active transportation. A transit-oriented district was identified as a transit station and the area around it. Zoning regulations in the transit-oriented district prohibit the building of single and two-family residential housing and basic industry facilities. Additionally, the minimum off-street parking requirements for businesses in these areas are reduced by 40%, to encourage non-vehicular travel.</p> <p><i>Traditional Neighbourhood Development Zoning</i></p> <p>The goal of the traditional neighbourhood development zoning was to increase residential dwelling density around neighbourhood urban centres or clusters. New infill developments that were compatible with the character of existing neighbourhoods, such as small grocery stores and retail shops, were encouraged.</p> <p>Initially, the City of Austin instituted complementary measures to support growth within the Desired Development Zone, such as fee reductions and differentiated utility reimbursements. The City created a smart growth matrix to determine how well the development fits into the city's overall smart growth plan, based on key qualities such as:</p> <ul style="list-style-type: none"> • location/proximity to transit, • pedestrian facilities and design characteristics, • compatibility with nearby neighbourhood plans, and • potential to increase tax base.

	<p>Developers with plans that rate highly in these characteristics were offered incentives, such as fee waivers, expedited plan review and transportation improvements. These incentives created an economic draw for developers and allowed for the City of Austin to meet its goals.</p> <p>Stakeholder Responsibilities</p> <p>The City of Austin hosted public consultations that involved all stakeholders and there was substantial public participation. In addition, the Planning Department created a smart growth matrix to illustrate to developers the financial incentives that the city would provide based on where they decided to develop in the city.</p> <p>Effectiveness</p> <p>Annual increases in walking, biking and transit ridership as the travel mode for commuting to work have occurred in Austin. Walking and transit ridership have both increased by 8%, while biking as the method of commuting has increased by 20%. Emission reduction estimates have not been estimated for the City of Austin Smart Growth Initiative as it still is in the process of implementation, however, it is estimated that commuter modal shift to transit has reduced NO_x by over 100 tonnes per year and VOC by 110 tonnes per year.</p> <p>Building permits issued between the 1997-2003 time period showed that approximately 70% were in the Desired Development Zone. Four hundred new residences and over 550,000 square feet of retail and office space were built in the targeted urban core. The results have also added \$200 million to the City’s tax base. The City was able to end the financial incentive program in June 2003 because market rates for housing and retail space in the preferred development zones was sufficiently high that developers no longer needed incentives to building in these areas.</p> <p>Enforcement and Administration</p> <p>There was no increase in enforcement and administration costs with the new zoning bylaws as compared to a business-as-usual scheme. The financial incentives for developers to build in the preferred zones acted as a draw.</p>
Other Leading Jurisdictions	<ul style="list-style-type: none"> • Montpelier, France has instituted a no vehicle zone in its city centre and used zoning to create mixed-use cluster developments. • Portland, Oregon has mandated through bylaws areas in their city that are designated “pedestrian districts”. Zoning in a pedestrian district encourages a heavy density of mixed residential and commercial land uses to encourage non-vehicular travel.
Implementation in Alberta	<p>With future population and development growth forecasted for municipalities in Alberta, setting zoning regulations to reduce transportation demand is an option. Municipalities in Alberta have the authority to amend their statutory plan and land use bylaws under Part 17 of the <i>Municipal Government Act</i>. However, appeals to changes in zoning bylaws can be made to the Province.</p>
Important References and Links	<p>City of Austin – Smart Growth Initiative http://www.ci.austin.tx.us/smartgrowth/</p> <p>The Legislative Framework for Municipal Planning, Subdivision, and Development Control, Alberta Municipal Affairs http://www.aema.gov.ab.ca/ms/pdf/legframework.pdf</p> <p>The City of Montpelier – Urban Development http://us.montpellier.fr/1805-achievement-on-a-metropolitan-scale.htm</p> <p>The City of Portland – Master Pedestrian Plan http://www.portlandonline.com/transportation/index.cfm?c=dhage</p>

3.11 Transportation Policy Tool #6: House-in-Order Programs to Reduce Emissions Through Procurement and Use of Vehicles

<p>Description of Policy Tool</p>	<p>Almost any organization, institution or business can voluntarily enact policies to procure low emission vehicles and use them in such a way that reduces air pollutant emissions.</p> <p>Low emission vehicles produce emissions that are below the fleet average, generally as a result of higher fuel efficiency. For example, vehicles with hybrid-electric technology are often considered low emission vehicles. Policies to reduce emissions from the use of vehicles also include efforts to reduce the overall mileage driven by the fleet and encourage fuel efficient driving behaviour.</p>
<p>Leading Jurisdictions</p>	<p>Many national, provincial/state and municipal governments and corporations have enacted a low emission vehicle procurement policy in their environmental House-in-Order programs. The North Central Texas Council of Governments, which includes the cities of Dallas-Fort Worth, produced a low emission vehicles procurement ordinance that specifies requirements for new vehicle procurement and auditing of the municipality's programs.</p>
<p>Leading Practice Example</p>	<p>NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS: PUBLIC ACTIVITY FLEETS INITIATIVE</p> <p>How the Tool Works</p> <p>The North Central Texas Council of Governments (NCTCOG) is a voluntary association of regional municipalities. In 2005 the Regional Transportation Council (RTC) which is the policy body for the NCTCOG developed and approved a resolution in support of a new Clean Fleet Vehicle Policy and model ordinance. This model ordinance included a low emission procurement policy and was voluntarily accepted by each regional municipality as part of their air quality management strategy. Adoption of the Clean Fleet Vehicle Policy entitles the adopting entity to compete for clean vehicle funding made available by the RTC.</p> <p>The adopted ordinance states that:</p> <ul style="list-style-type: none"> • Vehicle acquisitions for fleet expansion or replacement of model year 2004 or newer, shall be the newest model year or engine standard only. • Vehicle acquisitions to replace model year 2003 or older vehicles must show at least a 25% reduction in nitrogen oxides (NOx) emissions rate compared to the vehicle being replaced. Waivers are possible when new technologies or achievements of the required emission reduction are not possible. • Aftermarket technologies and conversions are acceptable for fleet expansion and fleet replacements. Aftermarket technologies and conversions must be Environment Protection Agency and/or the California Air Resources Board verified or certified. • Vehicles with the lowest NOx emissions that are capable of performing the required operational demands shall drive the most miles. • Vehicle idling is allowed only for safety, emergency response, vehicle maintenance and manufacturer recommended minimum idle/warm-up times. • Non-emergency vehicles shall drive no more than the posted speed limit and avoid rapid acceleration. • All drivers shall be trained on air quality appropriate operational requirements.

	<p>Stakeholder Responsibilities</p> <p>The NCTCG worked in consultation with members from the municipalities to create a procurement ordinance, which was brought back to each municipality's council to be approved and implemented as their own municipal regulation. Municipalities were then required to send their vehicle fleet information (size and activity) to the NCTCG for auditing.</p> <p>The NCTCG's role is to indicate to municipalities what vehicles are covered under the ordinance, to audit the municipal fleet programs and to provide information for municipal fleet and financial managers about state and federal incentive programs.</p> <p>Effectiveness</p> <p>The majority of the municipalities in the North Central Texas Council have enacted the model ordinance into their own regulations in less than two years. Currently 63 Local Governments, Transit Agencies, Independent School Districts and Other Transportation Service Providers have adopted the ordinance.</p> <p>In 2006, the RTC conducted a Clean Fleet Vehicle Call for Projects to provide project funding to entities in the region who had adopted the policy by October 2005.</p> <p>It is estimated that the replacement of vehicles in the period between 2006 and 2009 will result in a reduction of more than 2,300 tons of NO_x.</p> <p>Enforcement and Administration</p> <p>The NCTCG created a website which acts as a clearinghouse for information about clean vehicle technology and fuel guidance, state and federal grant information and interregional technology transfer. It also uses outreach events to educate fleet managers and municipal staff.</p> <p>In order to be eligible for funding emission reductions related to vehicle procurement and vehicle retrofit must be verifiable by the NCTCG.</p>
<p>Other Leading Practices</p>	<p>The US EPA's vehicle procurement policies require that 75% of all vehicles purchased by federal departments or agencies must be low emission vehicles.</p> <p>The City of Toronto has implemented a Green Fleet Transition Plan that proposes to replace 84 per cent of new, light-duty car and pickup planned vehicle replacements with hybrid-electric vehicles. The plan also includes measures to match the specifications in the City's fleet to their use, for instance by reducing gasoline engines from eight to six cylinders where feasible and using biodiesel in all diesel powered vehicles. It is estimated that upon full implementation that the City's fleet will reduce harmful emissions of NO_x and SO₂ by approximately 25 percent.</p>
<p>Implementation in Alberta</p>	<p>The low emission vehicle procurement policy could be mandated by the Government of Alberta and the regional municipalities in the airsheds.</p>
<p>Important References and Links</p>	<p>North Central Texas Council of Governments Clean Fleet Vehicle Model Ordinance http://www.nctcog.org/trans/clean/vehicles/fleet/policy/Resolution_CFVP.pdf</p> <p>North Central Texas Council of Government Clean Vehicle Fleet Policy http://www.nctcog.org/trans/clean/vehicles/fleet/policy/index.asp</p> <p>City of Toronto, Green Fleet Transition Plan http://www.toronto.ca/fleet/green_fleet_transition.htm</p>

3.12 Residential Policy Tool #1: Financial Incentives to Encourage Lower Emission Residential Equipment

<p>Description of Policy Tool</p>	<p>Older residential appliances and equipment such as refrigerators and furnaces can be substantially less energy efficient than new models. Even though replacement of older equipment could generate large operating savings for consumers and because of natural turnover may not occur because the older equipment is in good operational condition, the high capital cost of new equipment and additional costs such as disposal.</p> <p>Financial incentives, such as rebates and free pick-up and disposal, encourage consumers to turnover older residential appliances and equipment. Improved energy efficiency contributes to reductions in energy use which in turn, leads to reductions in air emissions.</p>
<p>Leading Jurisdictions</p>	<p>Throughout North America many publicly-owned utilities have offered rebates for the purchase of energy efficient appliances and equipment. Typically, mail in rebates are offered for the replacement of equipment that exceeds a certain age and the scheme is funded through government finances or Demand Side Management (DSM) programs. In some cases, consumers are also offered free disposal services.</p>
<p>Leading Practice Example</p>	<p>CALIFORNIA SINGLE FAMILY ENERGY EFFICIENCY REBATES</p> <p>How the Tool Works</p> <p>The Single Family Energy Efficient Rebate Program is a statewide program administered by all four California independently operated utilities and funded by electricity and gas public goods charges. It offers prescriptive rebates for energy efficient products in four distinct markets: Heating Ventilation and Cooling (HVAC), home improvement, appliances, and pool pumps. Its objectives are to achieve energy savings and demand reduction. There is also a formal regulatory mandate for hard-to-reach customer participation. Hard-to-reach customers typically do not participate in programs because of a lack of financial capital.</p> <p>Prescriptive rebates are available for various residential appliances including gas furnaces, water heaters, clothes washers and dishwashers. Rebates are also available for home improvement measures such as programmable thermostat, insulation, aerators and showerheads.</p> <p>Rebates levels are set based on market trends (past participation, new minimum standards, changes in the market place) and measured incremental cost. A qualifying product database and training is provided to contractors to assist in determining eligible products. Exhibit 1 indicates the eligible measures and rebate levels</p>

Exhibit 1: Eligible Measures and Rebates Levels for California Single Family Energy Efficiency Program

Eligible Measures for Residential Equipment and Appliances	Rebate Level
Heat Pumps	\$275-\$500
Central Air Conditioning	\$200-\$425
Whole House Fan	\$75
Whole House Evaporative Cooler	\$300
Energy Star Natural Gas Furnace	\$200
Programmable Thermostat	\$20
Energy Star Dishwasher	\$50
Energy Star Clothes washer	\$75
Room Air Conditioners	\$50
Pool Pump and Motor Replacement	\$100-\$250

Customers determine eligibility by contacting the utilities by phone or through their website and submit installation receipts. The utility validates the project and makes a payment within 6-8 weeks. Instant rebates are also available for programmable thermostats.

The program tracks leading indicators such as applications in the mail, online application downloads, number of application requests and website hits. This information is used to generate weekly real time reports that help staff identify program trends, measure program velocity, and make projections in order to stay ahead of the program and address concerns early.

Effectiveness

In 2002, an independent evaluator conducted a verification study and evaluation of the program. The program was found to have fairly high program awareness (41% of customers surveyed had heard of rebates), and achieved a total of 35,488,363 kWh savings and 3,768,799 in Therms savings. Exhibit 2 provides a summary of the program.

Exhibit 2: Results Summary for California Single Family Energy Efficiency Program in 2002

Program Expenditures	Total Incentives Paid	MWh reduction achieved	Therm reduction achieved	Unique Participants
\$25,921,725	\$16,874,639	35,488	3,768,799	177,123

Reductions in electricity use for the project contributed to an annual reduction of approximately 23,000 tonnes of CO₂ and 1 tonne of NO_x.

Stakeholder Responsibilities

The Single Family Rebate Program's program staff consists of 14 in-house staff and subcontractors, although this staff also manages other programs. The staff processes applications and provides customer service for the program. Trade allies and an outsourced advertising contractor primarily conduct advertising.

Enforcement and Administration

For a random sample of 5% of contractor-installed measures, on-site installation verifications of participants' rebated measures are conducted to confirm customer and equipment eligibility. A quality control process for the tracking system involves a random

	inspection by an independent evaluator, which may include a random inspection of paper applications, a matchup to tracking system entries, and/or verification that rebated measures qualified under the Single Family Rebate Program.
Other Leading Practices	<p>BC Hydro Fridge Buy-back Program</p> <p>The BC Hydro Power Smart Refrigerator Buy-Back Program was introduced province-wide in September 2003 to encourage residents to turn in their second operating refrigerator. Demand side management studies of household electricity use have indicated that second refrigerators represent substantial energy use but are infrequently used.</p> <p>The program offers a \$30 rebate, free pick-up and disposal in an environmentally friendly manner. The program is promoted through radio and newspaper advertisements, bill inserts and displays at appliance retailers. For the first year, the province-wide Refrigerator Buy-Back Program collected 41,291 refrigerators which represents in terms of energy and demand savings 34.96 GWh/year and 3.34 MW. Based on grid emission factors from British Columbia this corresponds to annual emission reductions of approximately 4 tonnes of NOx per year.</p> <p>BC Hydro's Power Smart was responsible for advertising and creating and staffing a clearinghouse to administer the program. Program funding over the 2003-2005 period for the province-wide campaign was \$9.78 million, with the goal of targeting 50,000 refrigerators.</p>
Implementation in Alberta	A DSM program that targets residential equipment could be implemented in Alberta in cooperation with EPCOR and ENMAX utilities. While these utilities have implemented small financial incentive programs in the past they have not developed detailed DSM strategies to achieve reductions energy end-use in the residential sector.
Important References and Links	<p>California Single Family Energy Efficiency Rebates http://www.eebestpractices.com/pdf/SummaryProfileReport_R24E.PDF http://www.eebestpractices.com/pdf/BP_R4.PDF</p> <p>BC Hydro Power Smart Refrigerator Buy-Back Program http://www.bchydro.com/powersmart/fridge/fridge8437.html</p>

3.13 Residential Policy Tool #2: Prescriptive Standards to Increase Energy/Resource Use Efficiency in Residential Buildings

<p>Description of Policy Tool</p>	<p>Most jurisdictions have building codes that prescribe minimum construction standards that property owners, municipalities and the building community must follow. Building Codes tend to provide very detailed requirements of how buildings should be constructed and are primarily meant to safeguard public health and safety. Increasingly, building codes in many jurisdictions encourage and promote energy conservation through the design of building envelopes and mechanical, electrical, and illumination systems.</p> <p>Prescriptive standards in building codes for residential buildings that necessitate higher energy-efficiency requirements reduce the amount of fuels and electricity required for space heating, water heating, space cooling and plug load. The reduction in energy requirements typically has a proportional impact on the reduction of associated particulate and ozone precursor emissions.</p>
<p>Leading Jurisdictions</p>	<p>Both the federal research agencies of the Canadian and American governments have published model National Energy Building Codes for their jurisdictions. However, the provinces and states have the authority for setting building code requirements. In the United States, California has adopted the most stringent building code. In Canada, the province of Ontario is considered the national leader in terms of prescribing codes for energy efficiency. In 2006, the Ontario governments passed Regulation 350/06 under the Building Code Act, which increased the energy-efficiency requirements above the Model National Energy Building Code for housing.</p>
<p>Leading Practice Example</p>	<p>ONTARIO BUILDING CODE: REGULATION 350/06</p> <p>How the Tool Works</p> <p>Ontario's Regulation 350/06 sets energy-efficiency prescriptive standards for residential housing components. The new Building Code sets incremental high energy efficiency requirements for building permits over the 2007-2012 timeframe. For instance, in 2007 Ontario's Building Code (OBC) requires that all new housing in 2007 be built with more energy efficient windows, higher insulation levels, and high-efficiency gas and propane-fire furnaces. In 2012, all new houses that are built to the requirements of the Building Code are projected to meet the EnerGuide 80 rating. The EnerGuide for Houses rating is a standard measure that rates the energy performance of existing or new houses on a scale of 0 to 100. An Energuide rating of 80 corresponds to an improvement over the old Ontario Building Code of approximately 35%.</p> <p>Stakeholder Responsibilities</p> <p>The Ontario Ministry of Municipal Affairs and Housing held province-wide consultations on the energy-efficiency changes to the Building Code. A technical advisory committee consisting of designers, builders, regulators, manufacturers, energy suppliers and non-governmental organizations reviewed the input from the consultations and made recommendations that were implemented in the Building Code changes.</p> <p>Effectiveness</p> <p>In 2012, the requirements in Ontario's Building Code (OBC) will be 25% higher than the Model National Energy Code for Buildings. The estimated energy savings for a new</p>

	<p>home built to the 2007 OBC versus the old Building Code is 21.5% by 2007, 28% by 2009 and 35% by 2012. The reduction in energy use will lead to significant emission reductions of particulate and ozone precursors.</p> <p>The average annual estimated energy savings per house constructed to EnerGuide 80 standards versus the old building code was estimated to be 35% at an incremental cost of approximately \$6,000 per dwelling. Estimates of the simple payback of building houses to the new standard were less than 8 years.</p> <p>Enforcement and Administration</p> <p>Program costs to implement a new Building Code initiative include the costs to draft proposed amendments, conduct additional consultations, and incremental costs for verification and additional training. These costs are significant but in general can be considered to be a part of regular programming costs and are small compared to capital costs for construction.</p>
Other Leading Practices	<p>The State of California's updated Building Standards took effect in October 2005, and will yield more than 500 megawatts in energy savings for the state by 2008. The new standards included the use of "cool roofs" and efficient lighting, as well as measures to encourage greater use of daylighting, better sealing of ducts, and improved window glazing.</p>
Implementation in Alberta	<p>The Alberta Building Code is based on the National Building Code of Canada, which does not set out minimum energy efficiency requirements. The Alberta Building Code was recently updated in 2005 and did not include significant additional requirements for energy efficiency for residential buildings. The government of Alberta could consider more aggressive energy efficiency requirements in the next update to the Alberta Building Code.</p>
Important References and Links	<p>Ontario Regulation 350/06 Building Code Act http://www.canlii.org/on/laws/regu/2006r.350/index.html</p> <p>Ontario Ministry of Municipal Affairs and Housing – New Building Code http://www.obc.mah.gov.on.ca/Page1402.aspx</p> <p>State of California Building Standards Commission http://www.bsc.ca.gov/</p>

3.14 Residential Policy Tool #3: Performance Standards for Consumer Products

<p>Description of Policy Tool</p>	<p>Consumer products are sold for household or commercial use, such as detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive aftermarket products.</p> <p>Performance standards for consumer products could be used to control emissions that result from the normal use of these products. The most common example is to establish VOC emission limits for consumer products as these products contribute a significant proportion of total VOC emissions. In Alberta it is estimated that household products contribute approximately 4% of total VOC emissions and are a significant source after industrial and transportation sources.</p>
<p>Leading Jurisdictions</p>	<p>A number of jurisdictions, particularly in the United States (at both the federal and State levels) have imposed mandatory VOC content limitations for particular categories of consumer and commercial products and have achieved considerable VOC reductions. The California Air Resources Board (CARB) has introduced the most aggressive Consumer Product Regulations to control VOC emissions.</p> <p>It should be noted that Environment Canada has proposed regulations to mandate VOC content limits for 98 product categories (including sub-categories) of consumer products. The regulations would apply to manufacturers, importers, distributors and retailers of consumer products sold in Canada. Environment Canada estimates that implementing the CARB VOC content limits in Canada could result in a 11% overall reduction in VOC emissions from reported products. The overall costs associated with reformulating products sold in Canada to meet the CARB VOC limits was estimated to be approximately \$3 million.</p>
<p>Leading Practice Example</p>	<p>CALIFORNIA CONSUMER PRODUCT REGULATIONS</p> <p>How The Tool Works</p> <p>In California over half a billion consumer products are sold annually that contribute over 245 tons per day of VOC emissions. CARB has introduced three consumer product regulations in California that adopt performance-based VOC limits. The first regulation (Article 1) covers only one category called antiperspirants and deodorants. The second regulation (Article 2) covers 44 categories and is simply called the "general consumer products regulation." The third regulation (Article 3) covers 36 categories of aerosol paints and coatings.</p> <p>The VOC limits were set on the principle of achieving the maximum feasible reduction in volatile organic compounds from consumer products that are technologically and commercially feasible. In total 150 VOC limits are set in these regulations for 115 categories of products.</p> <p>Exhibit 1 illustrates examples of some of the VOC limits set out in the general consumer product regulation.</p>

Exhibit 1: Table of VOC Product Standards (Percent Volatile Organic Compound by Weight)

Product Category	Effective Date	VOC Standard (% VOC by weight)
General Purpose Contact Adhesive	12/31/2006	20
Aerosol Cooking Sprays	1/1/1995	18
Air Fresheners – Double Phase Aerosols	12/31/2004	25
Brake Cleaners	12/31/2010	10
Furniture Maintenance Aerosols	12/31/2004	17
Non-aerosol General Purpose Cleaners	12/31/2004	4
Hair Spray	6/1/199	55
Non-aerosol Lawn and Garden Insecticide	12/31/2003	3
Non-aerosol Oven Cleaners	12/31/2008	1
Shaving Gel	12/31/2009	4
Tire Sealants and Inflators	12/31/2002	20

Source: California Air Resources Board. Consumer Products Regulation.

The regulation applies to retailers (any person who sells, supplies, offers for sale) and manufacturers of consumer products that are intended for use in the state of California.

Exemptions to the VOC standards are allowed where a manufacturer can clearly demonstrate that due to some characteristic of the product’s formulation, design, delivery systems or other factors, the use of the product will result in less VOC emissions compared to regulated products.

The vast majority of VOC containing consumer products are covered under the three consumer product regulations. However, agricultural use products, non-liquid articles (e.g., sponges, combs, empty bottles), drugs intended for ingestion, industrial products used exclusively for on-site manufacturing, laboratory reagents and prescriptive drugs are not included. Emissions related to these products are very small and are difficult to regulate under a consumer product regulation. In the case of non-liquid articles that may off-gas VOCs, it is difficult to measure their emissions.

Effectiveness

CARB has reported that its consumer product program has achieved more than 40% emission reductions and that 50% of these reductions were achieved through the VOC limit regulations. The average cost of reducing pollution from consumer products using performance regulations was estimated to be about 25 to 85 cents for every pound of VOC emissions prevented, which is comparable to other VOC regulations.

Although the national regulation (U.S. EPA National Volatile Organic Compound Emission Standards for Consumer Products) is similar in many aspects to the California regulation, it is less effective in reducing VOC emissions from consumer products. The national regulation does not include second tier standards, mid-term measure categories, or aerosol coatings. In comparison, the national regulation will only achieve a 20 percent reduction in VOC emissions from consumer products.

California has been regulating the VOC content in some consumer products since 1993 and has most recently introduced amendments to the legislation in 2006. In contrast, VOC regulations in northeastern states of the U.S. did not go into effect until 2005. As a result, California has had significant opportunity to consult with stakeholders and provide

	<p>them with sufficient time to reformulate products to meet newer, more stringent standards.</p> <p>Stakeholder Responsibilities</p> <p>CARB has been granted authority to regulate consumer products by the state legislature. Proposed regulations are developed by CARB staff who conduct research and conduct public stakeholder workshops. Proposed regulations are announced with a request for public comment and hearings are held to allow stakeholders to present their views.</p> <p>Enforcement and Administration</p> <p>CARB actively enforces the consumer product regulations, and has imposed heavy fines on a number of manufacturers that were found to be selling products that exceed VOC limits.</p> <p>In 2006, the Consumer Products Enforcement Section purchased a total of 2,685 consumer products; including hairsprays, household cleaning products, air fresheners, automotive chemicals, household pesticides, aerosols coating, and other chemically formulated products. These products were tested by ARB's Monitoring and Laboratory Division (MLD) for VOC content. Consumer products that exceed the appropriate VOC standard are investigated to confirm that there is a violation of the Consumer Products Regulations.</p> <p>In 2006, 41 separate cases were settled and over a \$1 million in penalties were collected.</p> <p>The cost-effectiveness of the regulatory amendments to the Consumer Products Regulation were considered, and it was determined that the amendments were cost-effective.</p>
<p>Other Leading Practices</p>	<p>Other jurisdictions outside the United States have not implemented VOC standard limits for consumer products; however, they have implemented regulations for similar products such as for paint products. The United Kingdom has implemented a products regulation called The Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2005. The UK legislation is based on EU Directive 2004/42/EC which all European Union member states must introduce. It covers coatings applied to buildings, their trim and fittings, and associated structures when applied for decorative, functional and protective purposes. It includes imported products, but specifically excludes aerosols and products applied under license to historic buildings. The legislation classifies products into 12 categories with separate VOC limits. All products in scope of the legislation must also be labelled accordingly. It is estimated that the European Union Paints Directive would lead to reductions in UK VOC emissions of 30.1 kilotonnes and across the European Union reductions in VOC emissions of 278.7 kilotonnes.</p>

<p>Implementation in Alberta</p>	<p>This type of policy tool could theoretically be applied at either the federal or provincial level. The federal government is currently examining a proposed regulation to establish VOC limits that could be based on the CARB Consumer Product Regulation or less stringent regulations in other jurisdictions such as the United States EPA regulation.</p> <p>It is likely that adopting VOC limits similar to CARB would result in significant reductions in consumer product VOC emissions in the range of 10 to 30%.</p> <p>The main barrier to implementation of performance based VOC standards for consumer products is the considerable research and consultations required to set appropriate standards. Considerable effort can be saved if the CARB legislation was used as a model and adopted in large part. Adoption of the regulation would increase rule consistency in North America as many companies would already be familiar with the California standards.</p>
<p>Important References and Links</p>	<p>Environment Canada. April 2006. <i>Collection of Economic and Technical Information on Personal Care and Household Products</i>. Final Report.</p> <p>California Air Resources Board. Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products. Website: http://www.arb.ca.gov/consprod/regs/cp.pdf http://www.arb.ca.gov/consprod/consprod.htm</p> <p>The Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2005. http://www.opsi.gov.uk/si/si2005/20052773.htm</p>

3.15 Residential Policy Tool #4: Promotion and Awareness - Integrated Home Retrofit Services

<p>Description of Policy Tool</p>	<p>Integrated home retrofit services refers to the promotion and provision of services that increase the energy efficiency and sustainability of homes. This includes subsidized home energy audits, training, access to financial incentives such as grants, discounts or preferred loans to install energy efficiency measures and referral services. The aim of integrated home retrofit services is typically to save homeowners money and also to reduce greenhouse gas and other pollutant emissions.</p> <p>Integrated home retrofit services have the potential to significantly reduce emissions related to residential space heating, water heating and electricity use. These services are typically provided by not-for-profit organizations or government programs.</p>
<p>Leading Jurisdictions</p>	<p>The Office of Energy Efficiency of Natural Resources Canada (NRCAN) has developed the residential energy assessment initiative (ecoEnergy Retrofit) to help property owners make retrofit choices that improve the comfort and energy efficiency of their home. This program is similar to the EnerGuide for Houses (EGH) program previously offered. The program provides grants to property owners who complete energy efficiency retrofits based on recommendations from licensed energy advisor who conduct a detailed on-site assessment. Eligible retrofits include heating systems, cooling systems, hot water systems, attic, exterior wall and basement insulation, air sealing, high performance doors and windows and low-flush toilets. However this program or similar provincial programs do not comprise an integrated home retrofit service. A more comprehensive approach would involve a “one stop shop” where households can get impartial, expert and personalized energy efficiency advice and assistance.</p> <p>The United Kingdom has a significant number of successful agencies that operate Integrated Home Retrofit Services. One example is the Kirklees Energy Services.</p>
<p>Leading Practice Example</p>	<p>UNITED KINGDOM: KIRKLEES INTEGRATED HOME RETROFIT SERVICE</p> <p>How the Tool Works</p> <p>Kirklees Energy Services (KES) was established in May 2000 as a ‘not for profit’ organization limited by guarantee. Supported by its three council areas its aim being to provide a ‘one stop shop’ for the promotion of energy efficiency. Stimulating and helping to deliver local action to improve domestic energy and educate and implement the greater use of renewable energy sources to the residents of the Kirklees, Calderdale and Wakefield Councils (Municipalities).</p> <p>KES is part of a national network of Energy Efficiency Advice Centres (EEACs). These EEACs are independently owned and operated and provide householders impartial and expert advice on how to improve energy efficiency, thereby reducing pollution, saving money and achieving affordable warmth. The programme is designed to ensure that customers can get clear and honest advice about systems and installers and ensure that they get the best value for money.</p> <p>KES offers the following services to householders in their region:</p> <ol style="list-style-type: none"> 1. Advice on suitable energy efficiency measures and renewable energy systems through their freephone number by qualified energy advisors 2. Referral to an approved installer from a locally developed network who can inspect

	<p>the property, recommend appropriate energy efficiency work and install insulation and heating energy efficiency measures.</p> <ol style="list-style-type: none"> 3. Discounted fixed price rates for the energy efficiency work 4. Access to preferential low interest loans through a network of credit unions 5. Direct cash-back incentives for installing energy efficiency measures. <p>Advertising of KES services was distributed with electoral rolls of households. Initial funding for the KES organization was partially through local city councils and grants provided by the Energy Saving Trust of the United Kingdom. Additional funding was provided by local utility companies when initial funds were depleted. The program is also self-funded through a 5% referral fee negotiated with approved installers.</p> <p>Energy efficiency measures includes cavity wall insulation, loft insulation, draught-proofing of doors and windows, heating controls, hot-water tank insulation, floor insulation and condensing boilers.</p> <p>Cash-back incentives provided by local councils included £300 for the installation of Condensing Boilers and 25% of the cost of all other insulation measures.</p> <p>Effectiveness</p> <p>A total of 1,455 households were retrofitted with 2,080 energy efficiency improvements in the period between 2000 and 2004. Of the energy efficiency improvements, three-quarters were made up of cavity wall insulation, loft insulation and high efficiency condensing boilers.</p> <p>In monetary terms, it is estimated that the scheme has resulted in annual savings of around 6 million kWh and 270,000 euros savings from householders utility bills. Based on average electricity emission factors in the United Kingdom the program saved approximately 10 tonnes of NO_x, 14 tonnes of SO₂ and 2 tonnes of PM annually.</p> <p>Stakeholder Responsibilities</p> <p>KES is controlled by an independent Board of non-Executive directors. As a condition of funding the national Energy Saving Trust in the United Kingdom has a service level agreement with the organization and conducts annual audits. KES also works closely with local authorities to develop strategies to meet the requirements of the Home Energy Conservation Act that sets targets for home efficiency.</p> <p>Potential installers were invited to tender to be part of a network of installers of the energy efficiency measures. Installers agreed on discounted pricing to be part of the scheme and agreed to pay a 5-10% referral fee to fund the scheme. Installers were also required to attend energy efficiency training provided by the organization.</p> <p>Three local credit unions that provided preferential loans to the scheme entered into a legal agreement with KES to secure the loans.</p> <p>Enforcement and Administration</p> <p>The quality of the scheme is monitored through inspections of 10 % of the installations. In addition annual auditing is conducted by the Energy savings trust.</p>
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<p>Other Leading Practices</p>	<p>National Grid USA EnergyWise Program</p> <p>National Grid USA, an investor-owned utility serving territories in the Northeastern United States, offered comprehensive home retrofit services to single family homes through turnkey contractors.</p> <p>The program included site visits to customer homes with measures recommended and installed on a case-by-case basis. Electrically heated residences were eligible to receive insulation, thermostats and air sealing. All residences, regardless of heating type were eligible for installation of baseload measures such as lighting. The program offered residential customers an incentive that covered up to 50 percent of the cost of all allowable measures, up to a maximum of \$1,000. Rebates of \$300 were also available to replace inefficient refrigerators. In 2001, the program served 5,012 single-family participants.</p> <p>Southern California Home Performance Program</p> <p>This program finds, screens, trains, and mentors qualified HVAC and remodeling contractors to deliver comprehensive home performance improvement packages tailored to the needs of each existing home and its owner. Conduct independent quality assurance inspections of the work completed and respond to any customer complaints.</p> <p>Ottawa EnviroCentre</p> <p>Since 1998 the EnviroCentre in Ottawa has been working to deliver programs that encourage energy conservation. Over 10,000 households in the Ottawa area have benefited from their various programs, including energy audits, energy-efficiency renovations and upgrades, installation of energy-efficiency devices. The centre also demonstrates and retails hard-to-find energy-efficiency products.</p>
<p>Implementation in Alberta</p>	<p>The federal ecoEnergy Retrofit program provides some of the incentives and services necessary to encourage home efficiency retrofits in Alberta. However, the federal program will likely impact relatively few households in relevant Alberta airsheds due to the limited promotion and assistance that is provided.</p> <p>An integrated home retrofit service is a more aggressive approach that provides a local centre within the airshed dedicated to offering households with energy efficiency services. This approach typically has higher participation and as a result higher reductions of air pollution. Some of the lessons learned from integrated home retrofit services provided in other jurisdictions include:</p> <ol style="list-style-type: none"> 1. Ensure that approved installers abide by a stringent customer care standard and have a dedicated interest in energy efficiency 2. Ensure that loan schemes do not eliminate many customers through rigorous eligibility criteria 3. Leverage cash-back incentives available from utilities and governments. 4. Establish viable funding mechanisms

Important References and Links	<p>Kirklees Energy Services http://www.managenergy.net/products/R451.htm http://www.managenergy.net/conference/2004/reynolds.pdf</p> <p>NRCan ecoEnergy Retrofit Residential Program http://www.oee.nrcan.gc.ca/residential/personal/retrofit-homes/retrofit-qualify-grant.cfm?attr=4</p> <p>Ottawa EnviroCentre http://www.envirocentre.ca/</p> <p>National Grid USA EnergyWise Program http://www.eebestpractices.com/pdf/SummaryProfileReport_R41.pdf</p>
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3.16 Commercial / Institutional Policy Tool #1: Financial Incentives to Increase Energy / Resource Use Efficiency in Commercial Buildings

<p>Description of Policy Tool</p>	<p>Energy and resource use efficiency in commercial building can be increased using financial incentives that are designed to encourage sustainable building practices. These sustainable practices contribute to building equipment and construction that uses less energy and as a result less air pollution.</p> <p>One of the main barriers to improving energy efficiency in buildings is overcoming price barriers to new technologies and practices and increasing their market share. Market share of new energy efficiency equipment and construction may be small because of the initial high cost of materials and design fees since many practitioners are not yet familiar with the practice.</p>
<p>Leading Jurisdictions</p>	<p>A number of provinces, states, municipalities and utility companies offer rebates for the construction or retrofitting of buildings that meet certain energy-efficiency standards and for the purchase of energy efficiency equipment. For instance, the State of New York in 2000, legislated a Green Building Tax Credit that can be used against business and personal income taxes to encourage the uptake of energy efficient technology in buildings, resulting in a reduction in energy-generated emissions.</p>
<p>Leading Practice Example</p>	<p>NEW YORK STATE GREEN BUILDING TAX CREDIT</p> <p>How the Tool Works</p> <p>New York State’s Green Building Tax Credit is an income tax credit program for owners and tenants of buildings which meet criteria for energy, indoor air quality, materials used in construction, water conservation and appliances. The tax credit targets multiple dwellings, business, mercantile, recreational, institutional and community and religious buildings that have a minimum size of 20,000 square feet and a minimum tenant size of 10,000 square feet. The credit is the first state tax credit for the construction of sustainable buildings in the U.S. and is credit against the building owner’s state income tax in an amount between five and eight percent of most development costs spread over five years.</p> <p>The energy-efficiency components are performance-based, requiring new buildings and tenant spaces to use 65% or less of the energy that a 1991 New York State Energy Conservation Construction Code (ECCC) compliant building would. Furthermore, renovated tenant space and buildings may use 75% or less of the energy allowed by the ECCC and office buildings must use 55-75% or less. Owners and tenants must work through an architect or engineer to obtain a Credit Component Certificate for their project. Energy reductions contribute directly to emission reductions of particulate and smog precursors.</p> <p>Additional criteria for indoor air quality, materials, commissioning, water conservation and appliances also indirectly contribute to reduced air emissions.</p> <p>Eligible taxpayers for the tax credit include corporations, utilities, banks, insurance companies and personal income taxpayers. Owners and tenants have over nine taxable years to claim their credit.</p>

	<p>Stakeholder Responsibilities</p> <p>New York State’s Green Building Tax Credit (GBTC) was initially conceived by private sector individuals interested in sustainable design. Various stakeholders, including real estate industry representatives, environmentalists, architects, engineers, developers, lawyers, and government officials produced the first legislative draft. After more meetings and considerable debate, the Natural Resources Defense Council (NRDC) and the Real Estate Board of New York (REBNY) drafted the version of the bill that was introduced to the State Legislature.</p> <p>The NY Department of Environmental Conservation is responsible for managing the tax credit program.</p> <p>Effectiveness</p> <p>For the 2000-2005 time period, the capped tax credit assisted in the building of seven “green” buildings. The amount of emissions saved from these buildings is unknown; however for the buildings to receive funding they must use at least 65% less energy than a baseline building. Therefore, the program produces a reduction in energy-generated emissions as compared to a business-as-usual approach.</p> <p>The green building credit was extended in 2006 to an additional five years through 2014 and allotted an additional \$25 million in credits.</p> <p>Enforcement and Administration</p> <p>The program runs in five year funding intervals, with a maximum credit cap of \$25 million per interval. If there are still funds remaining after the five year interval, the remaining funds can be carried forward. The maximum incentive per building is \$2 million.</p> <p>The Credit Component Certificates that certify compliance with the GBTC are issued by architects or engineers licensed in the State of New York. Applicants must keep records of performance measures such as annual energy consumption, yearly results of air monitoring, tenant green building guidelines, requests to remedy indoor air quality problems, as well as initial and monthly results of photovoltaic and fuel cell performance.</p> <p>The legislation requires that the New York Department of Environmental Conservation review and update the regulations for energy, appliances, and materials every two years.</p>
<p>Other Leading Practices</p>	<ul style="list-style-type: none"> • Manitoba Hydro offers incentives to commercial customers such as rebates, low-interest loans and free energy audits to decrease their energy use. • The Government of Canada’s ecoENERGY rebate provides \$10 for each gigajoule of energy saved from energy conservation retrofits. • The Oregon Department of Energy provides a tax credit for sustainable commercial building that meet the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED™) standard based on the square footage of the building.

<p>Important References and Links</p>	<p>New York State Green Building Tax Credit http://www.dec.ny.gov/energy/1540.html http://www.dec.ny.gov/regs/4475.html http://www.keystone.org/spp/documents/4_20_06Austin%20GBTC%20paper_Kneeland.doc</p> <p>Manitoba Hydro, Power Smart Commercial Incentives http://www.hydro.mb.ca/savings_rebates_loans.shtml#business</p> <p>Natural Resources Canada, Office of Energy Efficiency Energy Efficiency in New Buildings http://www.oe.nrcan.gc.ca/commercial/newbuildings.cfm http://www.oe.nrcan.gc.ca/commercial/financial-assistance/existing/implementation.cfm?attr=20</p> <p>Oregon Department of Energy Tax Credit http://oregon.gov/ENERGY/CONS/BUS/tax/sustain.shtml</p>
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3.17 Commercial Institutional Policy Tool #2: House-In-Order Building Performance Standards

<p>Description of Policy Tool</p>	<p>House-in-order programs that use building performance standards offer a way to clearly evaluate a building’s energy-efficiency performance. By setting minimum energy-efficiency performance standards for buildings, jurisdictions can reduce their energy demand and consumption, consequently reducing the associated particulate and ozone-precursor emissions.</p> <p>Building performance standards typically indicate the maximum energy use expressed as a unit of service area floor space (e.g., GJ / m²). The combination of the different fuels and electricity used for major building end-uses including space heating, water heating, space cooling and plug load are included in the building’s energy use.</p>
<p>Leading Jurisdictions</p>	<p>Several municipal and regional governments in Canada and the United States have adopted the Leadership in Energy and Environmental Design (LEED) rating system to set minimum performance levels for new buildings. The LEED rating system was developed in North America by the U.S. Green Building Council with a market-driven strategy to accelerate the adoption of green building practices. In Canada the Green Building Council (CaGBC) has tailored the US Green Building Councils (USGBC) LEED system for new construction specifically for Canadian climates, construction practices and regulations.</p> <p>LEED rated buildings are designed to require less energy for their operation and therefore their energy needs produce less emissions. For example, in 2004 the State of California adopted a “Green Building Action Plan”, which mandates a LEED standard for all state buildings and state-funded school construction and renovations.</p> <p>Increasingly, building codes in many jurisdictions also use performance based requirements to encourage and promote energy conservation in the design of building envelopes and mechanical, electrical, and illumination systems.</p>
<p>Leading Practice Example</p>	<p>STATE OF CALIFORNIA GREEN BUILDING ACTION PLAN</p> <p>How the Tool Works</p> <p>The State of California’s government mandated a 20% reduction in energy consumption in state buildings by 2015. In order to so, the Green Building Action Plan was introduced as a strategy to reach this goal. The Action Plan calls for all new state buildings and major renovations that are greater than 10,000 square feet must be designed, constructed and certified to LEED Silver or higher. Building projects that are less than 10,000 square feet must meet the same design standards, however they do not require certification. Furthermore, the Action Plan directs that all existing state buildings over 50,000 square feet meet at a minimum an Energy Star rating of at least 75 and LEED standards by 2015 at the latest.</p> <p>With regards to leasing building space that is greater than 5,000 square feet, state agencies are required to seek out and select space in buildings that meet a minimum Energy Star rating, where cost-effective for all leases by 2008.</p> <p>Stakeholder Responsibilities</p> <p>The California Sustainable Building Task Force, with representatives from various state departments such as Finance, Government Services, California Air Resources Board and</p>

	<p>the Environmental Protection Agency (EPA), worked to implement the initiation of the Green Building Action Plan. After initiation, responsibility was transferred to the Green Action Team, composed of members from the Department of Finance; Business, Transportation, and Housing; Environmental Protection; Resources; Education; State and Consumer Services Agencies; and at least five members from the private commercial real estate sector. The Green Action Team is responsible for monitoring progress and creating appropriate financial mechanisms to incentivize and encourage cost-effective projects.</p> <p>Effectiveness</p> <p>The amount of emission reductions is unknown, however currently eight new state buildings have been constructed and two existing buildings have been retrofitted to the LEED standard. In general, buildings classified as LEED Silver have an energy performance that is at least 25% lower than other buildings in the same class. The resulting decrease in fuel and energy use will lead to substantial reductions in emissions of particulate and ozone precursors.</p> <p>Enforcement and Administration</p> <p>The California Sustainable Building Task Force created a life cycle cost assessment methodology to evaluate the cost effectiveness of building or retrofitting to each LEED standard. State departments must show that they have undertaken this review to be granted funds.</p>
<p>Other Leading Practices</p>	<p>The City of Vancouver has mandated a green baseline of LEED Silver for all new municipal buildings.</p>
<p>Implementation in Alberta</p>	<p>Alberta already has significant experience with the use of LEED as a performance standard. The Government of Alberta has adopted the LEED Silver standard for the construction of new government buildings and the “Go Green” standard for the operation of its major building holdings. The City of Calgary has adopted a green building policy that states that all municipal facilities in excess of 500 m² must meet or exceed the LEED Silver standard. The City of Edmonton has mandated that all new municipal buildings must be constructed to meet or exceed the LEED Silver standard, effective January 1, 2008.</p> <p>Airshed management strategies could expand the existing experience of using LEED or other performance standards to encompass more than just government buildings. Stakeholders including retailers, commercial enterprises and industry could be encouraged to adopt energy performance standards.</p> <p>The 2005 Alberta Building Code has been recently updated and is the first edition of the Codes that uses an “Objective Based” approach. In principle the code is moving towards a performance based approach, as the code provides performance standards and solutions, not requirements. However, the building code does little to address energy efficiency and does not set any performance standards for energy efficiency.</p>
<p>Important References and Links</p>	<p>State of California, Green Building Action Plan http://www.documents.dgs.ca.gov/green/GreenBuildingActionPlan.pdf</p> <p>U.S. Green Building Council LEED Rating System http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222&</p> <p>Canada Green Building Council LEED Rating System http://www.cagbc.org/</p>

3.18 Energy Policy Tool #1: Financial Incentives to Encourage Lower Emission Electricity Generation

<p>Description of Policy Tool</p>	<p>Energy generation is one of the largest sources of air pollution in Alberta. In 2005 approximately 80% of the electricity generation in Alberta was from coal fired power plants. These plants have a relatively high emission intensity of particulate and smog precursors compared to alternative energy sources. However, alternative energy sources are often not cost competitive with coal powered generation unless environmental externalities such as air pollution are considered.</p> <p>Financial incentives can be used to encourage the adoption of lower emission intensity energy generation. Financial incentives can also help to drive down costs of newer technologies to make them more cost competitive.</p> <p>Lower emission energy generation typically includes renewable energies such as wind, hydro and solar power; but also high efficiency generation such as combined cycle natural gas power plants.</p>																		
<p>Leading Jurisdictions</p>	<p>Numerous countries including Germany, the Netherlands and Italy have developed aggressive renewable energy strategies that are based on providing financial incentives to encourage the adoption of renewable energy.</p> <p>In Canada, the province of Ontario is the current leader in providing incentives for renewable energy.</p>																		
<p>Leading Practice Example</p>	<p>GERMAN RENEWABLE FEED-IN TARIFFS</p> <p>How the Tool Works</p> <p>Feed-in tariffs for electricity from renewable energies were used for the first time in Germany with the adoption of the Electricity Feed Act (StrEG) in 1991. On 1 April 2000, it was replaced by the Renewable Energy Sources Act, which was amended on 21 July 2004.</p> <p>The Renewable Energy Sources Act sets specific pay-back prices (i.e., tariffs) for each individual renewable energy technology, based on their annually decreasing real cost. The aim of the tariffs is to initiate a self-sustaining market for renewables and create a critical mass through a large-scale market introduction programme, while not imposing any additional burden on the taxpayer. Exhibit 1 identifies the feed-in tariff rates that are offered and must be paid by grid operators to the suppliers of renewable energy.</p> <p>Exhibit 1: Feed in Tariff Rates identified in Germany's Renewable Energy Law</p> <table border="1" data-bbox="456 1593 1419 1936"> <thead> <tr> <th>Renewable Energy Source</th> <th>Type of Installation</th> <th>Tariff (Jan 2005)¹ Eurocents</th> </tr> </thead> <tbody> <tr> <td>Hydropower</td> <td>Small installations (up to 5 MW):</td> <td>9.67 c/kWh</td> </tr> <tr> <td rowspan="2">Landfill Gas, Pit and Sewage Gas, and Innovative Technologies</td> <td>Up to 500 kW</td> <td>7.67 c/kWh</td> </tr> <tr> <td>Up to 5 MW</td> <td>6.65 c/kWh</td> </tr> <tr> <td rowspan="3">Biomass</td> <td>Up to 150 kW</td> <td>11.5 c/kWh</td> </tr> <tr> <td>Up to 500 kW</td> <td>9.9 c/kWh</td> </tr> <tr> <td>Up to 5 MW</td> <td>8.9 c/kWh</td> </tr> </tbody> </table>	Renewable Energy Source	Type of Installation	Tariff (Jan 2005) ¹ Eurocents	Hydropower	Small installations (up to 5 MW):	9.67 c/kWh	Landfill Gas, Pit and Sewage Gas, and Innovative Technologies	Up to 500 kW	7.67 c/kWh	Up to 5 MW	6.65 c/kWh	Biomass	Up to 150 kW	11.5 c/kWh	Up to 500 kW	9.9 c/kWh	Up to 5 MW	8.9 c/kWh
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	Up to 5 MW	8.9 c/kWh																	

	5 MW to 20 MW	8.4 c/kWh
Geothermal	Up to 5 MW	15 c/kWh
	Up to 10 MW	14 c/kWh
	Up to 20 MW	8.95 c/kWh
	Over 20 MW	7.16 c/kWh
Wind Power	On-shore, varies according to yield	8.7 c/kWh
	Offshore, varies according to yield	9.1 c/kWh
Solar Power	Open-space installations	45.7 c/kWh
	Roof-top PV arrays up to 30 kW	57.4 c/kWh
	Roof-top PV arrays up to 100 kW	54.6 c/kWh
	Roof-top PV arrays > 100 kW	54.0 c/kWh
	Façade-mounted PV arrays up to 30 kW	62.4 c/kWh
	Façade-mounted PV arrays up to 100 kW	59.6 c/kWh
	Façade-mounted PV arrays > 100 kW	59.0 c/kWh

Note: ⁽¹⁾ Feed-in Tariff Rates decline over time by approximately 1 to 1.5 per cent annually.

Effectiveness

Feed-in tariffs have proven to be the most important and successful instrument to promote the expansion of renewable energies in the electricity sector in Germany. As a result of the tariffs, the share of electricity produced from renewable energy sources has almost doubled from 6.3 % in 2000 to 12.0 % in 2006. The expansion of renewable energies in Germany is advancing so successfully that the target of 12.5% share of renewables by 2010 set in the Renewable Energy Sources Act will be exceeded as early as 2007. Projections indicate that a 15 % share is likely to be achieved by 2010, with the minimum target of 20 % for 2020 being exceeded by a considerable margin. Germany is considering raising legal targets to at least 27 % for 2020 and at least 45 % for 2030.

In 2006 it is estimated that around 45 million tonnes of carbon dioxide (CO₂) emissions were saved because of the Feed-in Tariff system.

As a result of the Renewable Energy Sources Act and Feed in Tariff system Germany has become the world market leader in the wind energy sector and is on track to assume this position in the photovoltaics and biomass power plant sectors as well. More than €9 billion was invested in renewable energy installations in Germany in 2006. In all, around 214,000 people were employed in the renewables sector in 2006, an increase of 50,000 from 2004.

In 2006, the differential costs of providing feed-in-tariffs to electricity consumers in Germany was estimated to amount to €3.2 billion. However, these differential costs do not include savings as a result of a reduction of wholesale prices of electricity of €5 billion in 2006, savings of €0.9 billion on fuel imports in 2006 and estimated external costs of air pollution (including impacts of ozone and fine particulate) and climate change of around €3.4 billion.

Stakeholder Responsibilities

Under the tariff system grid operators must give immediate priority to renewable energy installations to their grid and to purchasing and transmitting all the electricity available from these installations. Installation operators must bear the costs of the connections while grid operators take on the necessary costs for upgrading the grid. Grid operators can take these costs into consideration in their charges to customers for use of the grid; however, the grid upgrading costs must be declared to ensure the necessary transparency. This obligation aims, in the interests of consumer protection, to prevent costs being shifted unfairly to the electricity purchaser.

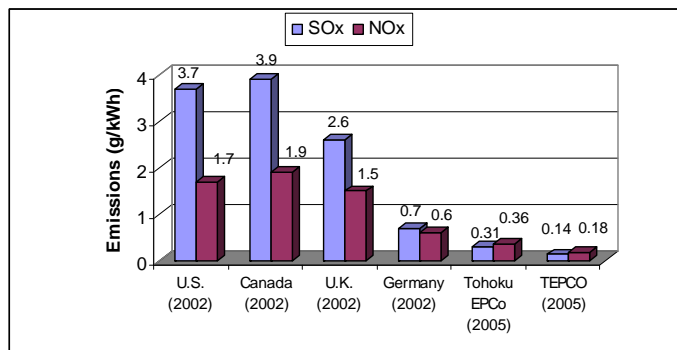
	<p>Enforcement and Administration</p> <p>The German Federal Environment Ministry is required to prepare reports to the legislature on the impact of the tariffs. The report must also identify recommended changes to the tariffs in view of changing market conditions.</p>
<p>Other Leading Practices</p>	<p>Ontario Standard Offer Contract</p> <p>Under a Standard Offer contract, Ontario offers small-scale renewable energy producers a tariff and allows them to sell renewable power to the grid for 20 years. There is no limit to the amount of renewable generating capacity that can be brought online through the program; however, projects can produce up to a maximum of 10 megawatts.</p> <p>For the period starting from the Program launch and ending on April 30, 2007, all Generators, except PV Generators, will be paid a Base Rate of 11.0 cents per kWh for Electricity. Projects that can reliably operate during On-Peak Hours (11 am to 7 pm EST) will be eligible for an additional 3.52 cents per kWh. PV Projects will be paid 42.0 cents per kWh.</p> <p>Texas Renewable Portfolio Standards</p> <p>In lieu of direct financial incentives specific renewable targets can be legislated for retail electricity suppliers. Under the Renewables Portfolio Standard (RPS) in Texas retail electricity suppliers have a requirement to include a specified percentage of renewables in their generation portfolio. The policy is backed up by annual renewable energy generation targets. Texas has set targets increasing to 2,880MW of renewables to be installed by 2009; this includes the addition of 2000MW from new renewable generating projects. Wind energy is currently dominating the new installed capacity of renewables with supply costs of around 3 c/kWh (which includes a 1.7 cent/kWh federal production tax credit).</p> <p>Projections show that the first year target of 400MW of new capacity to be installed during 2002 and 2003 will be exceeded significantly. The key factors considered to be contributing to the success of the policy are clear renewable energy targets, clear renewable resource eligibility requirements, stringent non compliance penalties, a Tradable Renewable Energy Certificate system that encourages flexibility and minimises costs, and a dedicated regulatory commission that fully involved numerous stakeholders during the detailed design of the policy.</p>
<p>Implementation in Alberta</p>	<p>Renewable energy tariff systems have been found to cost effectively support the establishment of a robust renewable energy market in a number of jurisdictions and lead to significant decreases in air pollution emissions. Currently the federal government provides a one cent per kilowatt-hour for up to 10 years to eligible low-impact, renewable electricity projects constructed before 2011.</p> <p>The federal incentive is very small in comparison to tariffs provided in other jurisdictions such as Germany, Texas and Ontario for small producers. Alberta could consider increasing financial incentives for renewable energy to encourage their development and reduce associated air pollution from generation.</p> <p>One lesson learned from other jurisdictions is that tariff rates should decrease overtime particularly in deregulated markets such as Alberta to continue to encourage new innovation.</p>

Important References and Links	<p>Germany Renewable Energy Law http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/erfahrungsbericht_eeg_en.pdf https://www.senter.nl/mmfiles/Renewable%20Energy%20Law_tcm24-117012.pdf</p> <p>Texas Renewable Portfolio Standards http://www.seco.cpa.state.tx.us/re_rps-portfolio.htm</p> <p>Ontario Standard Offer Contract http://www.powerauthority.on.ca/sop/</p>
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3.19 Energy Policy Tool #2: Public Information Disclosure on Emissions

<p>Description of Policy Tool</p>	<p>Public disclosure of emissions can be an important tool to raise public awareness and encourage energy producers to reduce emissions. In Alberta particulate and ozone precursor emissions of energy facilities are already reported to the National Pollutant Release Inventory (NPRI); however, it is difficult for the public to understand these emissions as they are not benchmarked against production and comparable between firms or facilities.</p> <p>Reporting that allows the public to compare the emissions intensity of firms (e.g., Tonnes of NO_x per kWh of electricity produced or Tonnes of SO₂ per barrel of oil produced) are substantially more useful as these metrics can be directly compared to identify high performing firms.</p>
<p>Leading Jurisdictions</p>	<p>It is increasingly common for utilities and energy producers to report their greenhouse gas (GHG) emission intensity in corporate sustainability reports. Many of North Americas leading energy companies and utilities regularly report these emissions to shareholders. It is considerably less common for facilities to directly report the emission intensity of other air pollutants such as particulate and smog precursors. While individual companies may decide to publish this information, a public disclosure program in Japan has resulted in most energy producers reporting the emission intensities of NO_x and SO₂.</p>
<p>Leading Practice Example</p>	<p>TOKYO METROPOLITAN GOVERNMENT INFORMATION DISCLOSURE PROGRAM</p> <p>How the Tool Works</p> <p>In the region around Tokyo power producers and suppliers are asked to voluntarily release reports that provide information on air emissions, targets to reduce air emissions and plans to introduce renewable energy. The following information is requested from power producers and suppliers:</p> <ul style="list-style-type: none"> • CO₂, NO_x and SO_x emission factors (emissions per electricity kilowatt hour) • Reduction targets for the emission factors • The amount of production that is renewable energy • Future schedules for the introduction of renewable energy <p>The release of this information helps electricity customers choose the most environment-conscious companies, driving competition for low emission and renewably sourced energy. Exhibit 1 provides a comparison of NO_x and SO_x emission intensities in four countries against emissions of two major utilities in Japan.</p>

Exhibit 1: Comparison of NO_x and SO_x Emission Intensities



Source: Estimated based on OECD Environmental Compendium 2004 and Corporate Environmental Sustainability Reports

Effectiveness

The program is credited with cutting emissions by 680,000 tons CO₂ annually. (This is about a 1% reduction of total CO₂ emissions in Tokyo – based on the same electricity consumption in 2005 as 2004 (84.9 billion kWh)).

Enforcement and Administration

Companies that do not publicly publish reports are formally asked to do so by the Tokyo Metropolitan Government (TMG). If the company still does not submit details, then the Government announces its name to the public, as a non-participant.

<p>Implementation in Alberta</p>	<p>Baseline NO_x and SO₂ emission intensity rates by electricity generating operators are already collected in Alberta as part of the emission trading program. Several of these companies also disclose these intensities in their annual corporate sustainability reports. Energy companies in Alberta could be encouraged to provide air emission data to highlight environmental performance and drive competition for low emission electricity or energy. This data should be comparative so that the performance of one company within a sector can easily be compared to the performance of other companies within the same sector.</p>
<p>Important References and Links</p>	<p>Tokyo Metropolitan Government Public Disclosure Program http://www.c40cities.org/bestpractices/energy/tokyo_companies.jsp http://www.tohoku-epco.co.jp/enviro/tea2006e/01/pdf/2006.pdf</p> <p>Emissions Management Framework for the Alberta Electricity Sector http://www3.gov.ab.ca/env/air/pubs/intensity_rates.pdf</p>

3.20 Agriculture Policy Tool #1: Bans or Restrictions to Reduce Agricultural Sector Emissions

<p>Description of Policy Tool</p>	<p>Regulatory bans or restrictions on the burning of agricultural residues can reduce overall emissions of particulate and ozone precursors from the agriculture sector, as well as episodic emissions during periods of high air pollution.</p> <p>Typically regulations prohibit or require permits for burning of agricultural residues in an effort to control the level and timing of the activity. A few jurisdictions prohibit agricultural burning at all times of the year and others when an air quality advisory has been issued that indicates high pollution levels.</p>
<p>Leading Jurisdictions</p>	<p>Bans or restrictions on burning in the agriculture sector have been used in many jurisdictions in the United States and Europe in an effort to improve air quality, particularly during periods of episodic air pollution.</p>
<p>How the Tool Works</p>	<p>IDAHO BURNING BAN</p> <p>How the Tool Works</p> <p>Environmental and health groups in Idaho successfully challenged the practice of agricultural field burning and brought into place a state-wide ban in 2006. Health advocates argued that field burning was an out-of-date management practice and pointed to successful grass burning bans in Oregon and Washington that were implemented without a significant loss of production.</p> <p>The burn ban in Idaho applies to burning of crop residue on fields where crops are grown. Burning regulations are contained in the Rules for the Control of Air Pollution in Idaho (Sections 600-617).</p> <p>Some forms of open burning are still allowable and include burning irrigation ditches or canals, burning fence lines for weed control, burning slash piles or prescription fires set by land-management agencies, as well as burning crop residue on the state's five Indian Reservations that are managed outside the State Implementation Plan.</p> <p>Effectiveness</p> <p>The burn ban in Idaho has eliminated a significant source of particulate emissions that has been attributed to many cases of asthma and a few cases of premature deaths.</p> <p>Burning on approximately 2,400 acres was eliminated. Farmers have reported concerns over drops in agricultural yields and the necessity for more expensive fertilizers and soil-disturbing tillage practices to replace old burning practices.</p> <p>Enforcement and Administration</p> <p>The burn ban is strictly enforced by the Department of Environmental Quality (DEQ) which is the state department with the mandate to protect Idaho citizens from the adverse health impacts of pollution.</p> <p>Violators of the ban face fines of up to \$10,000 fines and potential Clean Air Act citizen lawsuits of up to \$32,500.</p>

<p>Other Leading Practices</p>	<p>Puget Sound Clean Air Agency, Washington</p> <p>In the Puget Sound region agricultural burning permits are only provided to farmers who can demonstrate that the burning is necessary or meets criteria for best management practices. The burning must be part of a management practice for crop propagation or rotation, disease or pest control. Agricultural burning is also always prohibited during air quality burn bans and fire-safety burn bans and prior to any burning, the grower must call a toll-free agricultural burn line, to find out whether it is a burn or no-burn day.</p> <p>California</p> <p>In California, specific restrictions are also made on the type of material burned and moisture content of the material. For example, 3 days drying time is required for “spread” straw and 10 days is required for “rowed” straw before it can be burned.</p>
<p>Implementation in Alberta</p>	<p>Any regulation introduced in Alberta that bans or restricts agricultural activities will need to be synchronized with the Agricultural Operation Practices Act (AOPA). It is likely that the most effective instrument in Alberta would be to ban agricultural burning during episodic air pollution events.</p>
<p>Important References and Links</p>	<p>Idaho Burn Ban http://www.deq.idaho.gov/air/prog_issues/burning/agricultural.cfm</p> <p>Puget Sound Clean Air Agency, Washington http://www.ecy.wa.gov/programs/air/aginfo/research_pdf_files/AlternativesAgBurn.pdf http://www.ecy.wa.gov/pubs/wac173430.pdf</p> <p>California Smoke Management Guidelines for Agricultural and Prescribed Burning http://www.arb.ca.gov/smp/regs/RevFinRegwTOC.pdf</p>

3.21 Agriculture Policy Tool #2: Voluntary Agreement to Implement Best Management Practices to Reduce Agricultural Sector Emissions

<p>Description of Policy Tool</p>	<p>Agricultural Best Management Practices (BMPs) are practical, economical and feasible techniques to reduce environmental impacts on air, water and land. In the last 35 years, BMPs have been developed to optimize agricultural emissions for water quality protection purposes. Only recently have agricultural-related regulatory discussions begun to focus attention on air quality issues. While a wide range of BMPs aimed at soil conservation also reduce and control particulate and ammonia (NH₃) emissions, a few BMPs (such as using ammonia volatilization to remove nitrogen from manure to balance nitrogen for land application) can contribute to ozone formation and worse air quality.</p> <p>Voluntary agreements with farmers and livestock producers to use BMPs that reduce particulate and smog precursor (e.g., NH₃, NO_x) emissions have the potential to significantly decrease emissions from the agricultural sector.</p>									
<p>Leading Jurisdictions</p>	<p>While best management practices in agriculture have typically been developed to protect water quality, there are a number of good examples of BMPs that have been developed to reduce air quality impacts. Several non-attainment zones for PM₁₀ in the United States have developed Best Management Practices to control particulate emissions.</p>									
<p>Leading Practice Example</p>	<p>MARICOPA COUNTY, ARIZONA: AGRICULTURAL PM₁₀ BEST MANAGEMENT PRACTICES</p> <p>How the Tool Works</p> <p>Maricopa County in Arizona currently does not meet National Ambient Air Quality Standards for PM₁₀ and has been federally designated as a non-attainment zone under the US Clean Air Act. In response to the designation, Arizona established a state process to develop, implement and enforce agricultural best management practices (BMP) designed to reduce fugitive dust in the Phoenix area.</p> <p>Thirty four BMPs were identified by the regulatory authority as feasible, effective, and common sense practices to reduce particulate emissions while minimizing negative economic impacts on local agriculture. Exhibit 1 indicates a sample of these BMPs.</p> <p>Exhibit 1: Examples from Maricopa County PM₁₀ BMPs</p> <table border="1" data-bbox="477 1545 1365 1911"> <thead> <tr> <th>BMP</th> <th>Benefits</th> <th>Examples</th> </tr> </thead> <tbody> <tr> <td>Conservation tillage No tillage or minimum tillage that reduce loss of soil and water in comparison to conventional tillage</td> <td>Reduces the number of passes, soil disturbance. It improves soil because it retains plant residue and increases organic matter.</td> <td>Converting to no or low till operations, implement reduced till activities, adding soil/water amendments to improve resource and reduce tillage needs</td> </tr> <tr> <td>Combined operations Combine equipment, to perform several operations during one</td> <td>Reduction in the number of passes necessary to cultivate the land will result in fewer</td> <td>Combining cutting, discing and flat-furrowing in a single pass, cultivation and</td> </tr> </tbody> </table>	BMP	Benefits	Examples	Conservation tillage No tillage or minimum tillage that reduce loss of soil and water in comparison to conventional tillage	Reduces the number of passes, soil disturbance. It improves soil because it retains plant residue and increases organic matter.	Converting to no or low till operations, implement reduced till activities, adding soil/water amendments to improve resource and reduce tillage needs	Combined operations Combine equipment, to perform several operations during one	Reduction in the number of passes necessary to cultivate the land will result in fewer	Combining cutting, discing and flat-furrowing in a single pass, cultivation and
BMP	Benefits	Examples								
Conservation tillage No tillage or minimum tillage that reduce loss of soil and water in comparison to conventional tillage	Reduces the number of passes, soil disturbance. It improves soil because it retains plant residue and increases organic matter.	Converting to no or low till operations, implement reduced till activities, adding soil/water amendments to improve resource and reduce tillage needs								
Combined operations Combine equipment, to perform several operations during one	Reduction in the number of passes necessary to cultivate the land will result in fewer	Combining cutting, discing and flat-furrowing in a single pass, cultivation and								

	pass	disturbances to the soil. Other benefits are reduction of soil compaction and time to prepare fields	fertilization of field crop in a single pass
	Cover crops Use seeding or natural vegetation/regrowth of plants to cover soil surface	Reduces soil disturbance due to wind erosion and entrainment.	Plant or allow volunteer vegetation to grow in crop without tilling under thereby reducing tillage and increasing stabilizing of that portion of soil
	Downwind shelterbelts / boundary trees Planting rows of vegetation around facility	Reduces windblown dust	Use of perimeter barriers or vegetation to disrupt the wind flow around the facility or surrounding
	Bulk materials control Minimize visible dust emissions from bulk materials	Reduces entrainment of fugitive dust	To apply water or suitable chemical/organic, or cover the bulk materials with tarps, plastic or suitable material, or construct wind barriers such as a 3-sided structure surrounding the bulk materials (e.g.: feed commodity story barns)
<p>Commercial farmers in Maricopa County with greater than 10 contiguous acres are encouraged to voluntarily implement any of the 32 BMPs identified; however, a permit rule, Rule 806 - Conservation Management Practices, requires commercial farmers to implement at least three BMPs.</p> <p>In addition to the publishing of BMPs by the Maricopa County Air Quality Department, the Department of Agriculture provides educational training and information to farmers. The following services are provide at no charge:</p> <ul style="list-style-type: none"> • On-site training for workers on best management practices to reduce PM₁₀ during farming operations. • Information on overall compliance with local, state and federal air quality regulations • Assistance in the selection of agricultural PM₁₀ best management practices • Identification of options available to ensure compliance <p>Effectiveness</p> <p>The BMP rule 806, Conservation Management Practices, was put into effect in 2004. While particulate emissions have likely decreased from the agricultural sector due to the implementation of BMPs, particulate emissions from all sources including industry and transportation in Maricopa County have not declined and the county was still in non-attainment for PM₁₀ in 2007.</p> <p>Stakeholder Responsibilities</p> <p>The Maricopa County Air Quality Department provides air quality services to the</p>			

	<p>residents of Maricopa County by regulating and monitoring industrial sources, commercial sources and individuals.</p> <p>The Agricultural Consultation and Training Program offers a compliance assistance program for commercial farmers to ensure compliance with laws and rules that address air quality standards within the Maricopa County PM10 non-attainment area.</p> <p>Enforcement and Administration</p> <p>The Maricopa County Air Quality Enforcement Division is responsible for enforcing and ensuring compliance with federal, state and county air pollution regulations. Failure to comply with the provisions of Rule 806 can result in penalties of up to \$10,000 per day, per violation. A review of compliance reports indicates that no violations related to Rule 806 were recorded in 2006 for commercial farming operations.</p>
<p>Other Leading Practices</p>	<p>San Joaquin Valley Air Basin: Conservation Management Practices</p> <p>The San Joaquin Valley Air Basin has published a Conservation Management Practice Handbook intended to limit fugitive dust emissions from agricultural operation sites.</p> <p>The handbook was developed in cooperation with different agricultural stakeholders and contains program guidance and criteria to assist agricultural owners/operators in selecting BMPs. The Handbook includes descriptions of the BMPs, and other useful information about the Conservation Management Program.</p>
<p>Implementation in Alberta</p>	<p>Voluntary agreements to use Best Management Practices (BMPs) could be effectively used in Alberta to reduce particulate emissions from soil erosion and farm operations, and to reduce ammonia and VOC emissions from fertilizer use and manure management.</p> <p>Based on a review of other programs, farmers and livestock producers could readily take the actions needed to reduce air pollutant emissions if it can be done economically. In some cases there may be little or no cost to implement measures and the primary need is for education and to provide examples of BMPs that reduce emissions. Where significant costs are involved to implement BMPs, financial incentives can be used to encourage their adoption. Financial incentives have been successfully applied in the United States, Europe and in Canada to pay for actions on the farm which lead to improved environmental performance.</p>
<p>Important References and Links</p>	<p>Maricopa County, Arizona: Agricultural PM₁₀ Best Management Practices http://www.azda.gov/ACT/Rule806CMP%20Final%20Nov%2008.%202005.pdf http://www.azda.gov/ACT/bmpguide.pdf http://www.azda.gov/ACT/AirQuality.htm http://www.azdeq.gov/environ/air/prevent/download/sample.pdf</p> <p>San Joaquin Valley Air Basin: Conservation Management Practices http://www.valleyair.org/farmpermits/applications/cmp/cmp_list.pdf</p>

APPENDIX A

LONG-LIST OF AQM POLICY TOOLS

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TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Emissions Trading	Multi-sector emissions cap and trade regime		
		Example 1. Emission reduction trading system in Ontario for NO _x and SO _x for electricity producers and large industry. Ontario Regulation 397/01.	Federal, Provincial	http://www.oetr.on.ca/oetr/about_registry.jsp
		Example 2. The NO _x Budget Trading Program is a market-based cap and trade program created to reduce emissions of nitrogen oxides (NO _x) from power plants and other large combustion sources in the eastern United States.	Federal, Provincial	EPA's Nox Budget Trading Program http://www.epa.gov/airmarkets/progsregs/nox/sip.html
		Multi-facility emissions cap and trade regime within an airshed		
		Example 1. Illinois Emissions Reduction Market system designed to reduce VOC emissions in an area of Chicago that is non-attainment of federal ozone standards.	Provincial, Airshed	http://www.epa.state.il.us/air/erms/apr/2006/apr-2006-full.pdf
		Example 2: Proposed Cumulative Effects Management Framework for the Industrial Heartland Area in Alberta to manage NO _x and SO ₂ .	Provincial, Airshed	http://www.alberta.ca/home/NewsFrame.cfm?ReleaseID=/acn/200710/222176124AD64-E75E-2FFB-6DF1F0D2D55B2075.html
	Financial Incentives	Financial incentives to reduce emissions from new industrial facilities		
		Example 1. Rebates for the uptake of the best available low emission technology (includes combination of equipment, process and emission control equipment) in new facilities	Federal, Provincial	
		Example 2. Financial incentives for the retrofit of existing processes with best available emission control technologies (e.g. Grants to phase-out outdated high emission equipment)	Federal, Provincial	
		Example 3. Financial incentives for the retrofit of existing processes with lower emission technologies	Federal, Provincial	

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
AENV Mngmnt Category		Example 4. Rebates and grants for the performance of energy or emission audits	Federal, Provincial	NRCan's CIPEC energy audits for industrial facilities http://www.oee.nrcan.gc.ca/publications/infosource/pub/cipec/annualreport03-04/performance.cfm?attr=28
		Example 5. Financial incentive to switch from a high emission fuel to a low emission fuel (e.g., switching from the use of coal to natural gas will reduce emissions of both particulate and ozone precursors)	Federal, Provincial	Wisconsin, Industrial Boiler Fuel Switching http://dnr.wi.gov/environmentprotect/gtfgw/documents/McWGIN20071012.pdf
		Example 6. Low interest loans provided to firms that actively reduce emissions	All	Low interest financing in Japan for Air Pollution http://www.jetro.go.jp/en/market/report/pdf/2006_20_ms.pdf
		Example 7. Capital allowances into energy-saving plant and machinery that can be written off against taxable profits in facilities	Federal, Provincial	United Kingdom Enhanced Capital Allowances Program http://www.eca.gov.uk/
	Charges and Taxes	Charges and taxes to reduce emissions from new industrial equipment and processes		
		Example 1. Emissions tax	Federal, Provincial, Municipal	Greater Vancouver Regional District Industrial Emission Fees http://www.gvrd.bc.ca/air/pdfs/aqbylaw.pdf
		Example 2. Refunded emission tax - An emission limit per facility is set and emissions over this limit are taxed. If the firm emits emissions over the limit, and then invests in the best available technology available, the tax money is refunded.	Federal, Provincial	Sweden Nitrogen Charge http://www2.vrom.nl/docs/internationaal/w1-12a.pdf
	Other Market Instruments	Other measures to reduce emissions		
		Example 1. Legal liability that requires industry to compensate for accidental releases of particulate or NO _x above prescribed limits	Provincial	

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
		Example 2. Financial security that requires industry to place financial insurance with a regulator to ensure emission performance	Provincial		
Regulatory Approaches	Prescriptive Standards	Prescriptive standards to reduce emissions from industrial equipment and processes			
		Example 1. Mandatory use of low NOx combustion systems (e.g., low NOx burners, selective catalytic reduction)	Provincial, Airshed	Regulation of Emissions from Boilers and Heaters in the GVRD http://www.gvrd.bc.ca/air/pdfs/AQBylaw-Boilers-Heaters-Ma2007.pdf	
		Example 2. Mandatory use of low particulate emission systems (wet scrubbing technology, electrostatic precipitators)			
		Example 3. Mandatory use of Best Available Control Technology (BACT) or Lowest Achievable Emission Rate (LAER). BACT refers to the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems, and techniques. LAER refers to the most stringent emission limitation designated in any jurisdiction or achieved in practice.	Federal, Provincial, Airshed	Implementation of 1999 Gothenburg Protocol by European Union Countries http://unece.org/env/documents/2006/eb/EB/ece.eb.air.2006.4.add.2.e.pdf	
		Example 4. Mandatory use of vapour recovery systems to capture fugitive process VOCs (e.g., Capture of VOC emissions from chemical storage tanks and distribution systems)	British Columbia Gasoline Vapour Control Regulation http://www.env.gov.bc.ca/air/codes/gvcrgtc.html		
		Example 5. Establishing emission limits for industrial equipment or processes (e.g., CCME NOX limits by heat input for heaters and boilers)	Provincial, Airshed	Regulation of Emissions from Boilers and Heaters in the GVRD http://www.gvrd.bc.ca/air/pdfs/AQBylaw-Boilers-Heaters-Ma2007.pdf	
	Example 6. Adopt minimum energy efficiency standards for industrial equipment	Federal			
Performance-based Standards	Performance-based standards to reduce emissions from industrial equipment and processes				

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 1. Set facility-wide maximum emission levels	Provincial	US EPA Title V Facility Wide Permits http://www.epa.gov/oar/oaqps/permits/permitupdate/brochure.html
		Example 2. Tighten ambient criteria limits that must be met at facility boundary	Provincial	
		Example 3. Significant emission sources are required to temporarily reduce emissions during air quality advisories	Provincial	
	Bans/Restrictions	Bans/restrictions that reduce emissions from industrial equipment and processes		
	Regulatory Approvals and Permits	Regulatory approvals to reduce emissions from industrial equipment and processes		
		Example 1. New sources of emissions are permitted based on the use of technology that will achieve the lowest achievable discharge rate	Provincial	Integrated Pollution Prevention and Control Directive 96/61/EC for Best Available Techniques (BAT). http://ec.europa.eu/enterprise/environment/reports_studies/studies/bat.pdf
		Example 2. High industrial electricity users must adopt recognized energy-efficiency equipment in their operations in order to abide by their permit	Provincial	
		Example 3. Require industry sites with permits to undertake audits, develop action plans and implement cost viable actions to reduce emissions of particulate and smog precursors.	Provincial	Australia Industry Greenhouse Program http://www.c40cities.org/bestpractices/energy/melbourne_greenhouse.jsp
	Other Regulations	Mandatory program for integrated management of heat and electricity		
		Example 1. Japan's Energy Conservation Law	Federal	http://www.eccj.or.jp/law/revised/10aug2005.pdf
		Mandatory Code of Practice related to operations that impact emissions for specific industrial sectors		

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 1. Alberta has a number of Codes of Practice related to specific industrial sectors.	Provincial	Alberta Code of Practice for Compressor and Pumping Stations and Sweet Gas Processing Plants http://www.qp.gov.ab.ca/display_codes.cfm
		Negotiated agreements between governments and industry sectors to reduce emissions		
		Example 1. Agreement with sector stakeholders and industry associations to require emission reductions (e.g. European Union's Emission Trading Agreement)	Federal Provincial	EU's Emission Trading Agreement http://www.ieta.org/ieta/www/pages/getfile.php?docID=194
		Negotiated agreements between governments and a specific facility or company to reduce emissions		
		Example 1. Agreement with a specific facility or company to achieve emission reductions	Provincial	Quebec government and Noranda Ltd. Agreement to reduce allowable annual SO2 emissions
		House-in-Order agreements to reduce emissions from industrial facilities		
		Example 1. Monitor and report on emissions and energy use periodically	All	
		Example 2. Appoint an energy manager at each facility	All	
		Example 3. Adopt environmental management systems and certification (e.g. ISO 14001)	All	Japanese ISO 14001 Certifications http://www.jetro.go.jp/en/market/report/pdf/2006_20_ms.pdf
		Example 4. Adopt a renewable energy target for facilities or industrial sectors	All	Calgary Transit Corporation http://www.calgarytransit.com/environment/ride_dwind.html
		Promotion of voluntary measures to reduce emissions from industrial facilities		
		Example 1. Encourage industries (whole sector or individual facility) to set emission reduction targets	Provincial, Airshed	
		Example 2. Promote industries to implement non-mandatory actions to reduce emissions	Provincial, Airshed	http://www.p2pays.org/ref/23/22859.pdf
	Example 3. Encourage industries to participate in voluntary agreements to reduce emission reductions	Federal, Provincial, Airshed		
	Voluntary Agreements to reduce emissions from industrial facilities			

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 1. Develop voluntary agreements with an industrial sector or facility to reduce emission reductions within a specified timeframe	Federal, Provincial, Airshed	
Supportive Tools		Information disclosure of emissions / emission-intensity to public		
	Information Disclosure	Example 1. Emission / emission intensity reporting to government and voluntary reporting programs (e.g. NPRI)	Federal Provincial	National Pollutant Release Inventory http://www.ec.gc.ca/pdb/npri/
	Public Awareness	Public awareness campaigns Example 1. Provide educational material to industry representatives to inform them of regulations and potential emission reduction opportunities related to their industrial sector	Provincial, Airshed	
		Development of Codes of Practice to reduce emissions from industrial facilities		
	Development of Codes of Practice and Tools	Example 1. Best practices to maintain and service boilers, heaters and exhaust systems	Provincial	
		Development of tools to reduce emissions from the industrial sector		
		Example 1. Web based energy profiling tool that collects data on the energy consumption of an operation to illustrate how and when energy is being used and associated emissions	Provincial	Energy Profile Tool http://www.energyprofiletool.com/ept_demo/scripts/main.asp
	Provide training on methods to reduce emissions			
Capacity Building	Example 1. Training on emissions reporting software and the operation, maintenance and calibration of industrial equipment to minimize emissions	Provincial		
	Example 2. Training on use of renewable energy software, such as RETScreen	Provincial		
	Example 3. Training for facility managers on energy efficiency practices	Provincial	California Industrial Energy Efficiency Technology Outreach, Training, and Plant Assessment Program http://www.eere.energy.gov/state_energy_program/project_detail.cfm/sp_id=805	

TABLE A.1: INDUSTRIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 4. Training for facility managers on conducting energy audits	Provincial	

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Financial Incentives	Financial incentives to increase the manufacturing and purchase of low emission vehicles		
		Example 1. Reduction of annual registration fees for low-emission vehicles	Provincial	Ceres Investors and Environmentalists for Sustainable Prosperity, http://www.ceres.org/news/news_item.php?nid=340 European Commission Proposal http://www.europeanvoice.com/archive/article.asp?id=22506
		Example 2. Free parking for low emission vehicles (e.g., hybrid)	Municipal, Airshed	City of Los Angeles Free Parking for Hybrids http://www.lacity.org/LADOT/FreePark.htm
		Example 3. Rebates for the purchase of fuel-efficient vehicles	All	Federal ecoAUTO program, http://www.tc.gc.ca/programs/environment/ecotransport/ecoauto.htm
		Example 4. Offering "green financing" that offers a lower interest rate for the purchase of low emission vehicles	All	Desjardin Lower Premium Insurance for Hybrid Vehicles http://www.desjardins.com/en/particuliers/produits_services/assurances_biens/assurance_automobile.jsp
		Financial incentives to reduce emissions from existing vehicles		
		Example 1. Rebates for the purchase of auxiliary power units on heavy-duty vehicles	Federal, Provincial	Commercial Transportation Energy Efficiency Rebate Program, http://www.nrcan-rncan.gc.ca/media/archives/newsreleases/2003/2003109a_e.htm
		Example 2. Vehicle scrappage programs to remove high-emitting vehicles from the fleet	All	Cash for Clunkers Program http://www.city.kelowna.bc.ca/CM/Page464.aspx
		Example 3. Funding for emission control equipment programs for heavy vehicles including retrofit diesel oxidation catalysts, air scavenging systems and particulate filters.	All	BC Municipal Project, http://www.pyr.ec.gc.ca/airshed/BC_Municipal_Project_e.htm

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Financial Incentives	Financial incentives to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions		
		Example 1. Corporate and personal tax rebates for telecommuting	Federal, Provincial	Ireland's e-Work Website, http://www.ework.ie/ New Jersey Telecommuting tax credit http://www.gilgordon.com/downloads/taxcredit.txt
		Example 2. Corporate and personal tax rebates for the purchase of public transit passes	Federal, Provincial	Federal tax credit for public transit passes http://www.transitpass.ca/
		Example 3. Funding for cycling, walking and public transit infrastructure and their operations	All	City of Eugene, Washington State, http://www.eugene-or.gov/portal/server.pt?space=CommunityPage&control=SetCommunity&CommunityID=435&PageID=541
		Example 4. Subsidies for the transfer of freight to more energy efficient rail transport.	Federal, Provincial	Transport Canada Freight Sustainability Demonstration Program, UK Sustainable Freight Policy, http://www.dft.gov.uk/pgr/freight/
		Example 5. Tax relief for developers that build in a manner or in an area that decreases air emissions (i.e., infill development, brownfield development, mixed-use development, near transit routes, high density housing)	Provincial, Municipal	Ontario's Brownfield Financial Tax Incentive Program http://www.mah.gov.on.ca/Page5077.aspx
		Financial incentives to increase the usage of alternative fuels		
		Example 1. Exemption of alternative fuels (e.g. ethanol, biodiesel) from provincial fuel taxes.	Federal, Provincial	
	Charges and Taxes	Charges and taxes to increase the manufacturing and purchasing of low emission vehicles and reduce emissions from existing vehicles		

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Market Based Instruments and Fiscal Mechanisms	Charges and Taxes	Example 1. Higher fuel taxes	Federal, Provincial	Hydrocarbon Oils Duty Rates, http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_RatesCodesTools&propertyType=document&id=HMCE_PROD1_026429	
		Example 2. Higher registration fees or purchase taxes for vehicles with low fuel efficiency	Federal, Provincial	Ontario's Tax for Fuel Inefficient Vehicles http://www.rev.gov.on.ca/english/taxes/tffc/	
		Charges and taxes to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions			
		Example 1. Increasing parking pricing to discourage single occupancy vehicle use	Municipal, Airshed	Seattle Parking Programs http://www.seattle.gov/transportation/pdf/Parkingguide.pdf	
		Example 2. Road/congestion charges on expressways or downtown areas (e.g. Ontario's highway 407, London UK cordon charges)	Provincial, Municipal	Highway 407 ETR http://www.407etr.com/ Transport for London Congestion Charging http://www.cclondon.com/	
		Example 3. Vehicle registration insurance rates adjusted to reflect the number of vehicle kilometres travelled	Provincial	Norwich-Union's Pay-as-you-drive Insurance http://www.norwichunion.com/pay-as-you-drive/index.htm	
	Other Market Mechanisms	Investments in infrastructure to encourage modal shift and Transportation Demand Management			
		Example 1. Investment in pedestrian and cycling infrastructure. (e.g., construction of bike and pedestrian paths to encourage active transportation and reduce emissions from transportation).	All	City of Portland, Oregon. http://www.portlandonline.com/transportation/index.cfm?c=dhage	
		Example 2. Investment in public transit. (e.g., construction of rail or bus rapid transit in larger cities to encourage modal shift from high emission personal travel).	All	City of York's Transport Strategy, UK. http://www.york.gov.uk/content/45053/64877/64891/Local_transport_plan/Local_transport_plan_summary	

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Regulatory Approaches	Prescriptive Standards	Prescriptive standards to increase the manufacturing and purchase of low emission vehicles		
		Example 1. Mandate low emission engines for off-road vehicles	Federal	
		Prescriptive standards to reduce emissions from existing vehicles		
		Example 1. Mandating speed limiters on heavy-duty vehicles to reduce highway speeds	Provincial	Canadian Trucking Alliance Speed Limiter Policy http://www.cantruck.com/industry/speedlimiter.php#press
		Example 2. Mandating the use of single wide-base tires on heavy duty vehicles	Provincial	Use of New Technology Single Wide-Base Tires: Impact on Pavements http://www.comt.ca/english/programs/trucking/ON%20Wide%20Tire%20Study.pdf
		Prescriptive standards to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions		
		Example 1. Adopting walking and cycling facility requirements into building codes (e.g. secure bicycle storage, lighting)	Municipal	
		Example 2. Mandating HOV lanes on urban expressways	Provincial	Arterial HOV Lanes Where (and Why) Now? http://www.mrc.ca/pdf/cite2006.pdf
		Prescriptive standards to reduce emissions from fuel use		
		Example 1. Legislating minimum ethanol content levels of gasoline	Federal, Provincial	Ontario Regulation 535/05 – Ethanol in Gasoline http://www.ene.gov.on.ca/envision/news/2005/100701mb.htm
Example 2. Legislate minimum biodiesel content levels of diesel	Federal, Provincial	Proposed federal Renewable Fuel Content for diesel http://canadagazette.gc.ca/partI/2006/20061230/html/notice-e.html		

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Regulatory Approaches		Example 3. Require on-road low sulphur fuel for use in off-road vehicle applications (e.g., ATV's, tractors)	Federal	City of Toronto, http://www.gtacleanaironline.ca/portal/user/anon/page/default.psml/js_peid/main/media-type/html/language/en;jsessionid=96DA658F0EB65D2555EFBB3F4550EFC1?action=controls.Restore&portalid=ContentPageType%3A007&yzpage=5021&yzlookfeel=basic	
	Performance-based Standards	Performance-based standards to increase the manufacturing and purchasing of low emission vehicles			
		Example 1. Tighten vehicle tail pipe emission standards (e.g., adopt California's vehicle emission standards)	Federal, Provincial	California Low Emissions Vehicle II (LEVII) Regulations http://www.arb.ca.gov/msprog/levprog/levii/levii.htm	
		Example 2. Vehicle fuel consumption standards	Federal, Provincial	Japanese and European fuel efficiency standards http://www.theicct.org/documents/ICCT_GlobalStandards_20071.pdf	
		Example 3. Minimum energy efficiency standards for air conditioning systems and tires	Federal, Provincial		
		Performance-based standards to reduce emissions from existing vehicles			
		Example 1. Adopting road-side vehicle inspection and maintenance programs with minimum standards	Provincial	Metro Vancouver's AirCare Program www.aircare.ca	
	Bans or Restrictions	Technology/product bans or restrictions to reduce emissions from new vehicles			
		Bans or restrictions to reduce emissions from existing vehicles			
		Example 1. Anti-tampering legislation and enforcement for vehicle emission control equipment	Federal, Provincial		

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Regulatory Approaches		Bans or restrictions to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions		
		Example 1. Vehicle restrictions into city centres. Vehicles could be restricted based on the type of vehicle, time of day or based on license plates (e.g., allow even numbered license plates on even days)	Municipal	Municipality of Cambridgeshire, UK http://www.cambridgeshire.gov.uk/transport/around/city_access/rising+bollard+closures.htm
	Regulatory Approvals and Permits	Regulatory permits to reduce emissions from existing vehicles		
		Example 1. Inspection and Maintenance Programs that require periodic (typically every two years) emission testing to identify and repair high emitting vehicles	Provincial	Ontario Ministry of Revenue http://www.rev.gov.on.ca/english/taxes/tffc/
	Other Regulations	Other regulations to reduce emissions from existing vehicles		
		Example 1. Mandating energy efficiency driver training and testing to obtain a driver's license	Provincial	http://www.csrn.qc.ca/cftr/en/entreprises/en_trans_marchan.html
		Example 2. Legislating anti-idling bylaws	Municipal	http://www.oee.rncan.gc.ca/communities-government/transportation/municipal-communities/reports/existing-bylaws.cfm?attr=28
		Example 3. Transit priority measures such as bus lanes, preferred curb access and traffic signal priority	Municipal	Los Angeles' Traffic Signal Synchronization Program http://ladpw.org/Traffic/TSSP.cfm
		Other regulations to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions		
	Example 1. Develop zoning by-laws and siting plans that encourage mixed-use, high density communities	Municipal	American Planning Association, Research Department www.planning.org/smartgrowthcodes/	

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 2. Amend zoning by-laws to permit a wider variety of housing types to encourage density and mixed-use	Municipal	American Planning Association, Research Department www.planning.org/smartgrowthcodes/
Negotiated Agreements		Negotiated agreements to increase the manufacturing and purchase of low emission vehicles		
		Example 1. Agreements with automobile manufacturers and dealers to supply a higher proportion of low emission vehicles	Federal, Provincial	
		Example 2. Agreements with fleet operators (e.g., taxi companies, car rental agencies, truck distribution fleets) to use low emission vehicles	Airshed	Oxford City Council, UK, Taxi Quality Partnership http://www.oxford.gov.uk/files/seealsodocs/38179/AQAP_Final_April06_.pdf
Voluntary Stewardship and Corporate Responsibility	House-in-Order	House-in-Order programs to reduce emissions through procurement and use of vehicles		
		Example 1. Low emission vehicle procurement policies	All	City of Sacramento http://www.greenfleets.org/Sacramento.html
		Example 2. Employee fuel efficiency driver training	All	Alberta Motor Association http://www.ama.ab.ca/cps/rde/xchg/SID-53ED365C-F0F499AF/ama/web/everything_auto_fuel-efficient-course-5410.htm
		House-in-Order programs to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions		
		Example 1. Employer based trip reduction programs (e.g. telecommuting, providing in-house daycare service for employees)	Airshed	Go Green Choices program, www.gogreen.com/choices
		Example 2. Business travel and parking policies that promote public transportation, active transportation and carpooling	All	Go Green Choices program, www.gogreen.com/choices

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
AENV Mngmnt Category	Promotion of Voluntary Measures	Example 3. Logistics and fuel consumption monitoring software for shippers so that they can better plan and manage their fuel use	All	Forest Engineering Institute of Canada's Spec+ http://www.feric.ca/index.cfm?objectid=2DBAACA9-E081-222F-A4FA3438F435AF16	
		Example 4. Parking policies that promote carpooling	All	Go Green Choices program, www.gogreen.com/choices	
		Promotion of voluntary measures to increase purchase of low emission vehicles and reduce emissions from existing vehicles			
		Example 1. Recognizing firms that promote the purchase of low emission vehicles and that have adopted practices for reducing emissions from their fleets	Airshed	Illinois Green Fleet Program. http://www.illinoisgreenfleets.org/fact-sheet.html#6	
		Example 2. Encouraging firms to adopt business travel and parking policies that promote public transportation and active transportation	All		
Supportive Programming	Information Disclosure	Information disclosure to increase the procurement and use of low emission vehicles			
		Example 1. Support and development of prominent fuel efficiency labeling for vehicles and vehicle components (e.g. air conditioners, tires)	Federal, Provincial	France eco-labelling for Cars http://www.ecologie.gouv.fr/article.php3?id_article=5754	
		Example 2. Promote eco-labeling of low emission off-road engines	Federal		
	Public Awareness Campaigns	Public awareness campaigns that reduce emissions from the procurement and use of vehicles			
		Example 1. Promotion of vehicle maintenance (e.g. tire inflation pressure, vehicle cold-starting).	All	Autosmart Program for Canada's Novice Drivers. http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=145	
		Public awareness campaigns that encourage low emission land use development			

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Supportive Programming		Example 1. Public information campaign on measures that can contribute to reducing the urban heat island effect. Specific information includes, examples and general resources about the use of light covered surfaces for buildings and roads, as well as the planting of urban trees and gardens in strategic locations to reduce heat generation and cooling costs.	Provincial, Municipal, Airshed	City of Chicago's Urban Heat Island Initiative http://www.epa.gov/heatisland/pilot/chicago.html	
		Public awareness campaigns to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions			
		Example 1. Promoting active transportation and its corresponding health benefits	Airshed	Go Green Choices program, www.gogreen.com/choices	
		Example 2. Promotion of carpooling	Airshed	Smart Commute Initiative http://www.tc.gc.ca/programs/environment/UTSP/ProgressupdateGTAH06.htm	
		Example 3. Promote commuter challenges (i.e., challenges for employees to reduce their pollution impact from commuting) between communities or corporations	Airshed	Commuter Challenge http://www.commuterchallenge.ca/	
		Example 4. Promoting public transit as an option to single occupancy vehicle travel (e.g., providing commuter maps for public transit)	Municipal, Airshed	Travelsmart Program, Australia. Social Marketing Study. http://www.travelsmart.vic.gov.au/	
Supportive Programming	Development of Codes of Practice and Tools	Development of codes of practice and tools to encourage modal shift and Transportation Demand Management (TDM) that reduces emissions			
		Example 1. Codes of practice for freight shippers that promote fuel efficiency techniques	Federal, Provincial		
		Example 2. Development of Codes of practice for modal integration to promote public transit use (e.g. Park-and-Ride, bicycle racks on buses)	Provincial, Municipal	City of Calgary Transit Corporation http://www.calgarytransit.com/html/transit_oriented_development_guidelines.pdf	

TABLE A.2: TRANSPORTATION SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 3. Develop model design standards and codes that can be adopted by local communities to encourage high density development	Provincial, Municipal	American Planning Association, Research Department www.planning.org/smartgrowthcodes/
		Example 4. Development or use of software and tools for community planning that consider emission impacts	All	Clean Air and Climate Protection (CACP) software. http://www.cacpsoftware.org/
		Example 5. Develop land-use planning guidelines for municipal and local governments (e.g., zoning and siting recommendations to reduce vehicle trips and encourage higher density development)	Provincial, Municipal	
		Development of codes of practice to reduce emissions from existing vehicles		
		Example 1. Development of Codes of Practice for the selection and amount of the optimal winter traction material	Airshed, Municipal	British Columbia. Road Dust Mitigation Best Practices. http://www.env.gov.bc.ca/air/airquality/pdfs/roaddustbmp_june05.pdf
	Capacity Building	Capacity building programs that reduce emissions from existing vehicles		
		Example 1. Fuel efficiency training for mechanics	Airshed, Municipal	
		Example 2. Training to support fleet and logistics management that can reduce fuel use and emissions from fleets	All	
		Example 3. Development of carpooling websites that allow users to find matching commuters	Airshed, Municipal	City of Calgary Carpool Program. http://content.calgary.ca/CCA/City+Hall/Business+Units/Transportation+Planning/Transportation+Solutions/Sustainable+Transportation/Regional+Carpool+Programs/Regional+Carpool+Program.htm

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS				
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Emission Trading	Multi-sector emissions cap and trade regime that includes large institutional or commercial facilities		
	Financial Incentives	Financial incentives to increase energy / resource use efficiency in commercial buildings		
		Example 1. Green building tax credit to encourage building owners and developers to design, construct and operate buildings that are energy efficient, utilize recycled materials, provide clean air, and incorporate renewable and energy efficient power generation	Provincial, Municipal	New York State Green Building Tax Credit http://www.dec.ny.gov/regs/4475.html
		Example 2. The RightLights Program in Santa Cruz California provides subsidized lighting upgrades and free professional assistance to help businesses lower their energy costs.	Provincial, Municipal, Airshed	RightLights Program, Santa Cruz California http://www.rightlights.org/
		Financial incentives to encourage new or retrofit lower emission commercial equipment		
		Example 1. Equipment Replacement Programs (e.g., local utility demand side management programs to replace boilers, chillers and air conditioning units)	Federal Provincial	Vermont Gas http://www.aceee.org/utility/ngbestprac/vgswork.pdf
		Example 2. Financial incentive offered through utility demand side management programs to replace inefficient equipment	Provincial, Airshed	Power Smart Traffic Lighting Program http://www.bchydro.com/business/success/story4287.html
		Financial incentives to encourage switching to lower emission commercial fuels or energy sources		
		Example 1. Rebates and grants for the performance of energy or emission audits	Federal, Provincial	NRCan ecoEnergy Retrofit Program http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/index.cfm?attr=0
		Example 2. Sales tax rebate program for on-site renewable generation (e.g., wind, solar, landfill gas)	Provincial	Ontario Provincial Sales Tax Rebate on residential solar equipment
		Example 3. Grant program for on-site renewable generation	Provincial	New Internal Energy Generation Program for Small Businesses in Northern Ontario http://www.mndm.gov.on.ca/nohfc/Default_e.asp

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS					
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
		Example 4. Financial incentive to switch from a high emission fuel to a low emission fuel (e.g., switching from the use of fuel oil to natural gas will reduce emissions of both particulate and ozone precursors)	Provincial	Building Owners and Managers Association of the Greater Toronto Area http://www.bomatoronto.org/cdm/CDM_FAQ.pdf	
	Charges and Taxes	Taxes and charges to increase energy / resource use efficiency in commercial buildings			
		Example 1. Additional tax or charge on electricity use	Provincial		
		Example 2. Additional tax or charge on natural gas or fuel oil use	Provincial		
		Example 3. Additional tax or charge on commercial potable water use	Municipal		
		Taxes and charges to encourage lower emission equipment, fuels and energy sources			
	Example 1. Emission Tax	Federal, Provincial, Municipal	Greater Vancouver Regional District Industrial Emission Fees http://www.gvrd.bc.ca/air/pdfs/aqbylaw.pdf		
Other Market Mechanism	Third party financing of energy efficiency retrofits				
	Example 1. Energy Performance Contracting where commercial building owners do not pay up front for building retrofit, rather Energy Service Companies pays for the retrofit upfront and building owners pay them back over an agreed period based on guaranteed savings.	Airshed	Berlin Energy Agency, Energy Performance Contracting http://www.c40cities.org/bestpractices/buildings/berlin_efficiency.jsp		
Regulatory Approaches	Prescribed Standards	Prescriptive standards for buildings			

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS				
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		Example 1. Prescriptive building Codes have a large impact on the average energy efficiency of new commercial construction. Emission reductions from this initiative are primarily a result of lower demand for space heating, water heating, space cooling and lighting in new buildings. The Government of Ontario has introduced an aggressive new building code with the filing of Ontario Regulation 350/06 on June 28, 2006. The 2006 OBC requires that by 2012 new non-residential and larger residential buildings (i.e., greater than three stories) be constructed to a standard that is 25% better than the Model National Energy Code for Buildings (MNECB).	Provincial	http://www.obc.mah.gov.on.ca/Page1402.aspx
		Prescriptive standards for commercial equipment		
		Example 1. Emission Standards for fuel combustion equipment. The federal government of Canada sets national NO _x Emission Guidelines for Commercial Boilers and Heaters. More aggressive standards are set by jurisdictions such as the Greater Vancouver Regional District (GVRD).	Federal, Provincial, Airshed	http://www.ec.gc.ca/cleanair-airpur/caol/OGEB/electric/industry/guidelines/boilers_e.htm http://www.epa.gov/region10/psgb/indicators/air_quality/media/pdf/WCEL%20Recommendations%20to%20GVRD%202005.pdf
		Prescriptive standards for fuels or energy sources		
		Example 1. Legislate minimum biodiesel content of heating oil	Provincial	
	Example 2. Legislate minimum procurement of renewable energy	Provincial		
	Performance Standards	Performance standards for buildings		

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS					
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
		Example 1. Performance based building standards. Several municipalities and regional governments in Canada and the United States have adopted the voluntary Leadership in Energy and Environmental Design (LEED) rating system to prescribe minimum performance levels for new buildings. The rating system is based on a checklist of sustainable practices and measures that are incorporated into commercial construction.	Provincial Municipal	Seattle LEED Standards Program http://www.c40cities.org/bestpractices/buildings/seattle_green.jsp LEED in Canada http://www.green.ca.gov/GreenBuildingActionPlan/default.htm	
	Bans or Restrictions	Ban or restriction of high emission products with acceptable low emission alternatives			
	Regulatory Approvals and Permits	Regulatory approvals to reduce emissions from industrial equipment and processes			
		Example 1. New sources of emissions are permitted based on the use of technology that will achieve the lowest achievable discharge rate	Provincial	Integrated Pollution Prevention and Control Directive 96/61/EC for Best Available Techniques (BAT). http://ec.europa.eu/enterprise/environment/reports_studies/studies/bat.pdf	
	Other Regulations	Regulation to require energy management programs for large commercial facilities			
		Regulation to require buildings to incorporate renewable energy systems			
			Example 1: Ordinance that requires buildings to incorporate low-temperature systems for collecting and using active solar energy for the production of hot water	Municipal	Barcelona Solar Thermal Ordinance http://www.managenergy.net/conference/2004/ruyet.pdf
		Include regulatory provisions in that limit emissions from construction			
			Example 1. Requirements that limit emissions from construction in approvals. (e.g., dust control, low emission construction equipment)	Provincial	http://www.epa.gov/diesel/construction/casestudies.htm
	Negotiated Agreements	Negotiated agreements with commercial businesses or governments to reduce emissions			
		Example 1. Agreement with a commercial business or level of government to take actions that would	All		

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS				
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		reduce emission reductions		
Voluntary Stewardship and Corporate Responsibility	House-in-Order	House-in-Order agreements to reduce emissions from commercial / institutional facilities		
		Example 1. Voluntarily monitor and report on emissions and energy use periodically	All	
		Example 2. Voluntary building labeling programs. The Leadership in Energy and Environmental Design (LEED) rating system administered by the Canadian Green Building Council (CaGBC) awards certification at different levels for green buildings based on a checklist of sustainable practices and measures that are incorporated into commercial construction.	All	Environmental Certification for Commercial Buildings, City of Toronto http://www.bomatoronto.org/go_green_with_winners.cfm
		Example 3. Appoint an energy manager at each facility	All	
		Example 4. Establish a green procurement policy	All	City of Whistler Sustainable Purchasing Guide http://www.whistler2020.ca/whistler/site/genericPage.acds?context=1967998&instanceid=1967999
		Example 5. Adopt an environmental management system and certification (e.g. ISO 14001)	All	
		Example 6. Adopt a renewable energy target for a facility	All	
	Example 7. Conduct an energy audit and implement non-mandatory actions to reduce emissions	All		
	Voluntary Agreement	Voluntary Agreements to reduce emissions from commercial facilities		
Example 1. Develop voluntary agreements with commercial facilities to reduce emissions within a specified timeframe		Airshed		
Supportive Programming	Information Disclosure	Eco-labeling of commercial office equipment to identify low emission alternatives		
		Information disclosure of emissions / emission-intensity to public		

TABLE A.3: COMMERCIAL/INSTITUTIONAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS					
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
		Example 1. Larger commercial and institutional facilities and businesses may disclose their emissions in their annual reports	Airshed	Carbon Disclosure Project http://www.cdproject.net/	
	Promotion and Awareness	Public awareness campaigns that encourage resource conservation and lower emissions from commercial sector			
		Example 1. Promote behavioral changes that reduce energy-use. The Clean Air Foundations Doors Closed campaign encourages commercial businesses to close their doors during smog events to reduce energy consumption by reducing store air conditioning requirements.	All	http://weconserve.ca/doorsclosed/?page_id=11	
	Development of Codes of Practice and Tools	Tools that allow businesses and institutions to identify the level of impact of emissions related to their activities			
		Example 1. Emission inventory tools that allow small businesses to easily calculate their emission impacts.	Federal, Provincial	Ecological and Carbon Footprint Calculator http://www.footprinter.com/	
	Capacity Building	Provide training to facility operating managers on methods to reduce emissions			
		Example 1. Training for facility managers on energy efficiency practices	Federal, Provincial	NRCan Dollars to Sense Energy Management Workshops http://www.oeo.nrcan.gc.ca/industrial/training-awareness/index.cfm?attr=0	
Example 2. Training on maintenance and operation of commercial equipment to minimize emissions		Federal, Provincial, Airshed			

TABLE A.4: ENERGY SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Emission Trading	Emission cap and trade scheme for particulate and ozone precursors for electricity generators and primary energy producers		
		Example 1. Emission reduction trading system ifor NO _x and SO _x for electricity producers and large industry.	Federal, Provincial	Alberta Emission Trading in Electricity Sector http://www3.gov.ab.ca/env/air/pubs/AtoZTrading.pdf Ontario Regulation 397/01. http://www.search.e-laws.gov.on.ca/en/isysquery/b3ce2409-3af9-4e08-b2a4-39fc623bc6f3/1/frame/?search=browseStatutes&contxt=
	Financial Incentives	Financial incentives to encourage lower emission energy generation		
		Example 1. Combined Heat & Power (CHP) programs can generate power and make productive use of waste heat increasing overall energy efficiency. In New Jersey a CHPr program offers qualifying customers, contractors, and energy service companies incentives to purchase and install various types of high efficiency CHP units. Example 2. Financial incentives for the retrofit of existing energy production facilities with best available emission control technologies (e.g. grants to phase-out outdated high emission equipment) Example 3. A financial incentive to produce energy using renewable technologies. In Ontario a "Standard Offer Contract" provides a tariff payable to renewable producers in Ontario of \$0.11/kWh for wind power, small hydro and biomass projects over a 20 year lifetime. The tariff for photovoltaic technologies is as high as \$0.42/kWh. A similar incentive is provided to residential and commercial customers to install solar water heaters.	Provincial	New Jersey CHP program http://www.njcleanenergy.com/commercial-industrial/programs/combined-heat-power/combined-heat-power
Federal, Provincial	US EPA Title V Facility Wide Permits http://www.epa.gov/oar/oaqps/permits/permitupdate/brochure.html			
Provincial	Ontario Standard Offer Contract http://www.powerauthority.on.ca/sop/			

TABLE A.4: ENERGY SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
AENV Mngmnt Category		Example 4. Financial incentive to switch from a high emission fuel to a low emission fuel (e.g., switching from the use of coal to natural gas will reduce emissions of both particulate and ozone precursors)	Provincial	
		Example 5. A financial incentive to encourage small producers of power. Many public utilities now allow reverse metering or net metering that allows a small power consumer to directly offset power from the power grid or export power to the grid.	Provincial	Ontario Net Metering Program http://www.energy.gov.on.ca/english/pdf/renewable/NetMeteringBrochure.pdf
		Example 6. Provide low-interest loans to renewable energy projects	Federal Provincial	
		Example 7. Corporate income tax write-offs, capital tax exemption for assets and buy-down programs for the generation of renewable energy	Provincial	Ontario 100% income tax write-off and capital tax exemption for renewable energy sources Capital and Performance-Based Buy-Down Programs for Photovoltaics in California http://eetd.lbl.gov/ea/EMS/cases/BuyDowns.pdf
		Financial incentives for Conservation and Demand Management (CDM) programs		
	Example 1. Allow energy distribution companies to use historical profits towards CDM programs such as providing financial incentives to customers to install high energy efficiency technologies (e.g., residential/commercial/industrial equipment, appliances and lighting)	Provincial	Ontario Energy Board http://www.oeb.gov.on.ca/html/en/industryrelations/ongoingprojects_distconservation.htm	
	Charges and Taxes	Taxes and charges to encourage lower emission energy generation		
	Example 1. Higher Taxes on Fossil Fuels	Federal, Provincial	Denmark Emission Taxes	
Regulatory Approaches	Prescriptive Standards	Prescriptive Based Standards to encourage lower emission energy generation		
		Example 1. Mandatory Code of Practice for measurement and control of fugitive VOC Emissions from equipment leaks.	Federal, Provincial	CCME Code of Practice for VOC emissions from equipment leaks https://secure.encryptedtransactions.com/dfocus/ccme

TABLE A.4: ENERGY SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
AENV Mngmnt Category				/eng/detail.cfm?sku=CCM-1025-00-00-0&selectedCat=CCM-ATM-	
		Example 2. Technology requirement for low venting equipment to reduce VOC fugitive emissions and recovery of flare gas.	Provincial		
	Performance Standards	Performance Based Standards to encourage lower emission energy generation			
		Example 1. Set facility-wide maximum emission levels	Provincial	US EPA Title V Facility Wide Permits http://www.epa.gov/oar/oaqps/permits/permitupdate/brochure.html	
	Bans or Restrictions	Ban or restrictions that encourage lower emission energy generation			
		Example 1. Ban or restrict new development of coal-fired electricity generation. The government Ontario is considering the phase-out of coal electricity generation.		Ontario Coal Phase-Out http://www.energy.gov.on.ca/index.cfm?fuseaction=english.news&news_id=100&body=yes	
	Regulatory Approvals and Permits	Lower allowable limits for electricity generation			
Other Regulations	Mandate Demand Side Management (DSM) programs for energy utilities				
Negotiated Agreements	Negotiated agreements between governments and electrical utilities				
	Example 1. Agreement with electrical utilities to require emission reductions	Provincial	Negotiated Agreements with Energy Industry in the Netherlands http://www.senternovem.nl/mmfiles/hta_secgen_tcm24-171838.pdf		
Voluntary Stewardship and Corporate Responsibility	Voluntary Agreements	Voluntary Agreements to reduce emissions from energy producers			
		Example 1. Develop voluntary agreements with the energy sector to reduce emission reductions within a specified timeframe	All		

TABLE A.4: ENERGY SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Supportive Programming	Information Disclosure	Information disclosure of emissions / emission-intensity of electrical generation		
		Example 1. Require electricity generators to regularly publish the amount of air pollution they are emitting, and demonstrate their plans to shift to renewable supplies.	Airshed	Tokyo Renewable Energy Strategy http://www.c40cities.org/bestpractices/energy/tokyo_companies.jsp
	Capacity Building	Supporting public and private research and development efforts to identify low emission technologies for energy sector		
		Supporting air emission monitoring networks to collect data to measure emission impacts		
		Developing and supporting emission inventory tools, air dispersion modelling tools and emission impact assessment tools		

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Market Based Instruments and Fiscal Mechanisms	Financial Incentives	Financial incentives to increase energy / resource use efficiency in residential buildings			
		Example 1. Mortgages that have preferential rates for low impact housing.	All	http://www.cmhc.ca/en/co/moloin/moloin_008.cfm	
		Example 2. A tax exemption for the purchase of new green homes (e.g., a GST or PST tax exemption)	Federal, Provincial	http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/43/01031.htm&Title=43&DocType=ARS	
		Example 3. Grants for home energy audits	Federal, Provincial	NRCan ecoEnergy Retrofit Program http://oeec.nrcan.gc.ca/residential/personal/home-improvement.cfm?attr=0	
		Example 4. Building permit feebate based on level of energy efficiency of new houses	Airshed, Municipal	http://www.builtgreencanada.ca/uploads/files/Media_-_Press_Release_15-Dec-06_-_Builders_Save_on_City_of_Calgary_Permits_for_Built_Green_Homes.pdf	
		Example 5. In the United States homeowners are eligible for a tax credit of up to \$500 for 10% of qualified energy efficiency improvements such as insulation. Insulation levels must meet the requirements of the 2004 International Energy Conservation Code (typically adding an additional R-19 to R-30 insulation to their attic).	Federal, Provincial	http://www.simplyinsulate.com/content/tax_credits/existing_home.html	
		Financial incentives to encourage new or retrofit lower emission residential equipment			
		Example 1. Equipment exchange programs such as the Chill Out: Appliance Exchange Program in London Ontario that targeted the replacement of 3,500 low energy efficiency fridges, freezers and air conditioners using cash incentives.	Provincial, Municipal	http://www.londonhydro.com/lh_website/residential/great_refrigerator.jsp http://www.reepwaterlooregion.ca/	
		Example 2. Encourage replacement of low efficiency household furnaces with high efficiency condensing furnaces featuring advanced heat exchanger designs that extract more heat. Residential customers can be offered mail-in-rebates or grants for ENERGY STAR® qualified natural gas furnace purchases for furnaces equipped with a high-	Provincial	NRCan ecoEnergy Retrofit Residential Program http://www.oeec.nrcan.gc.ca/residential/personal/retrofit-homes/retrofit-qualify-grant.cfm?attr=4	

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information		
AENV Mngmnt Category	Policy Tool Sub-Categories	efficiency electronically commutated motors.				
		Financial incentives to encourage switching to lower emission residential fuels or energy sources				
		Example 1. Sales tax rebate program for solar energy systems	Provincial	Ontario Clean Air Incentive http://www.ene.gov.on.ca/programs/4708e.pdf		
		Example 2. Financial incentive to switch from fuel oil to natural gas for home heating (i.e., switch to a lower emission intensive fuel)	Provincial			
		Example 3. Accelerated depreciation for capital costs of renewable energy technologies	Provincial	Australia State of Victoria Renewable Energy Targets		
		Financial incentives to encourage the use of lower emission household products				
		Taxes and charges to increase energy / resource use efficiency in residential buildings				
		Taxes and charges to encourage the purchase of lower emission residential equipment				
		Taxes and charges to encourage switching to lower emission residential fuels or energy sources				
		Charges and Taxes	Example 1. Additional tax or charge on electricity use	Provincial		
			Example 2. Additional tax or charge on natural gas or fuel oil use	Provincial		
			Example 3. Additional tax or charge on home potable water use	Municipal		
			Taxes and charges to encourage the use of lower emission household products			
			Example 1. Implement a charge to manufacturers for every pound of VOC produced.	Federal, Provincial		
Prescriptive Standards to increase energy / resource use efficiency in residential buildings						
Regulatory Approaches	Prescriptive Standards		Example 1. Prescriptive standards have a large impact on the energy efficiency of new residential construction. Emission reductions from this initiative are primarily a result of lower demand for space heating, water heating, space cooling and	Provincial	Ontario 2005 Building Code http://www.obc.mah.gov.on.ca/site4.aspx	

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
		lighting in homes. The Government of Ontario has introduced an aggressive new building code with the filing of Ontario Regulation 350/06 on June 28, 2006. The 2006 OBC identifies standards for new home construction that will meet an EnerGuide rating of 80 by 2012.			
		Prescriptive standards for residential equipment			
		Example 1. Emission limits for natural gas or fuel oil space heating or water heating appliances. Germany sets emission limits for domestic natural gas appliances in the standards of the Deutsches Institut für Normung eV (DIN).	Federal, Provincial	Australia NOx emissions standards for domestic gas appliances http://www.environment.gov.au/atmosphere/airquality/publications/residential/noxexisting.html	
		Example 2. Mandate minimum energy efficiency standards for household appliances California has a mandatory minimum efficiency standard for appliances and residential equipment that is typically above the federally designated Energy-Star rating.	Federal, Provincial		
		Example 3. Mandate that all new gas containers purchased in region meet spill-proof and low emission standards.	Provincial	Austin Texas Clean Air Action Plan http://www.ci.austin.tx.us/airquality/caap.htm	
		Prescriptive standards for products			
	Example 2. Product VOC emission standards for solvents. California has set aggressive VOC content standards (as a % of total product volume) for many different products including adhesives, aerosols, cleaners, fresheners, hair products and windshield washer fluids.		http://www.arb.ca.gov/consprod/regs/cp.pdf		
	Performance Standards	Performance Standards for residential equipment			
		Example 1. Energy Performance Standards (e.g., Requiring all new appliances to meet Energy-Star ratings).			
		Performance Standards to increase energy / resource use efficiency in residential buildings			

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
AENV Mngmnt Category	Policy Tool Sub-Categories	<p>Example 1. New Residential Building Code performance requirements. Energy Star for New homes is a voluntary program that recognizes superior energy performance in new homes and is promoted by the United States Environmental Protection Agency and used in numerous jurisdictions including Ontario, Oregon, Washington, Idaho and Vermont. Northwest ENERGY STAR qualified homes are up to 30% more efficient than homes built to state code.</p>		<p>http://www.northwestenergystar.com/index.php?cID=125</p>
		<p>Ban or restriction of high emission residential equipment</p>		
		<p>Example 1. Ban on use of woodstoves during air quality advisories</p>	<p>Airshed</p>	<p>Prince George Clean Air Bylaw http://www.city.pg.bc.ca/city_services/utilities/airquality/faq/</p>
		<p>Example 2. Restrictions on gas powered household equipment such as lawnmowers during periods of high ozone levels.</p>	<p>Airshed</p>	<p>City of Toronto Leafblower Restriction on Smog Days http://www.toronto.ca/legdocs/2006/agendas/committees/plt060306/it016.pdf</p>
		<p>Ban or restriction of high emission household products with acceptable low emission alternatives</p>		
Regulatory Approaches	Other Regulations	<p>Zoning By-laws to encourage lower resource intensity (i.e., emission intensity) development</p>		
		<p>Regulation to require energy efficiency rating of housing at time of sale</p>		
		<p>Example 1. Regulation requiring that all households meet certain building standards when they are sold, transferred or renovated.</p>		<p>Berkeley Building Ordinance http://www.c40cities.org/bestpractices/buildings/berkeley_standards.jsp</p>
		<p>Bylaws to discourage household practices that contribute to the release of emissions</p>		
		<p>Example 1. Amend or adopt regulations to ban the open burning of trees, shrubs and brush from land clearing, trimmings from landscaping, or trash that lead to VOC and NO_x emissions.</p>	<p>Airshed</p>	<p>Washington State http://www.ecy.wa.gov/news/2006news/2006-173.html</p>

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Voluntary Stewardship and Corporate Responsibility	Voluntary Agreements	Voluntary agreements with home builders and developers to use low emission construction techniques			
Supportive Programming	Information Disclosure	Eco-labelling of Equipment or Products to identify low emission alternatives			
		Example 1. Energy Star labelling for household equipment, appliances and products such as windows. California sets minimum efficiency standards for appliances and equipment that are typically higher than US federal standards.	Federal, Provincial	US State Appliance and Equipment Energy Efficiency Standards http://www.standardsasap.org/documents/06stateupdate.pdf	
		Example 2. Home energy efficiency ratings. An Energy Star performance rating has been developed by the United States Environmental Protection Agency.	Federal, Provincial	Energy Star Home Performance Efficiency Rating http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes	
	Promotion and Awareness	Integrated home retrofit services			
		Example 1. Comprehensive home retrofit program that provides energy auditing services for homeowners and identifies financial incentives, cost savings and emission reductions (e.g., Energuide for Houses program)	Federal, Provincial, Airshed	Calderdale & Kirklees Energy Savers, United Kingdom http://www.managenergy.net/products/R451.htm	
		Educational material that provides the public with an overview of issues related to emissions			
		Example 1. Public education and outreach programs that provide up to date information on air pollution such as Ontario's OnAIR program	Provincial, Airshed	Ontario OnAIR Program http://www.airqualityontario.com/	
		Deliver public awareness campaigns that encourage resource conservation and lower emissions by the public			
Example 2. Facilitate programs to encourage home renovation and rehabilitation in existing neighbourhoods	Airshed				
Example 1. Educate realtors, lender and home buyers on the use of resource-efficient mortgages (i.e., a resource-efficient mortgage factors the cost	Airshed				

TABLE A.5: RESIDENTIAL SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
		savings of living closer to public transportation and having an energy-efficient home into a mortgage rate).		
	Development of Codes of Practice and Tools	Tools that allow the public to identify the level of impact of emissions related to their activities		
		Establish model design standards to encourage energy efficient and low emission building design		
	Capacity Building	Provide public training on methods to reduce emissions		
		Example 1. Workshops for residential wood-stove users on best practices that reduce woodstove emissions	Airshed	Regional District of Nanaimo http://www.rdn.bc.ca/cms.asp?wpID=1372
Support home audits that identify cost effective emission reduction opportunities.				

TABLE A.6: AGRICULTURE SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS

AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information
Market Based Instruments and Fiscal Mechanisms	Financial Incentives	Financial incentives to decrease emissions in the agriculture sector		
		Example 1. Providing financial incentives to encourage management practices of agricultural lands that reduce wind blown dust (i.e., tilling practices, buffer zones, forest breaks)	Federal, Provincial	
		Example 2. Providing financial incentives for manure management practices that reduce VOC emissions from animal waste	Federal, Provincial	
	Charges and Taxes	Taxes and charges to decrease emissions in the agriculture sector		
Regulatory Approaches	Prescriptive Standards	Prescriptive Standards to decrease emissions in the agriculture sector		
		Example 1. Prescriptive standards that reduce wind blown dust (i.e., tilling restrictions, requirement for buffer zones, forest breaks)	Provincial	
	Bans or Restrictions	Ban or restriction to decrease emissions in the agriculture sector		
		Example 1. Ban open air burning of agricultural residues	Airshed	
Example 2. Ban anaerobic manure waste management lagoons	Provincial, Airshed			
Negotiated Agreements		Negotiated Agreement with farm organizations		
Voluntary Stewardship and Corporate Responsibility	House-in-Order	Adoption of agriculture best management practices to reduce emissions		
		Example 1. Tilling in agricultural residues or using residues for energy generation	All	
		Example 2. Recovery of methane from waste management systems	All	
	Example 3. Reduced use of fertilizers and pesticides	All		
Voluntary Agreements	Voluntary agreements with farmers to reduce emissions			

TABLE A.6: AGRICULTURE SECTOR AIR QUALITY MANAGEMENT POLICY TOOLS					
AENV Mngmnt Category	Policy Tool Sub-Categories	Potential Air Quality Management Policy Tool and Relevant Examples	Typical Lead Implem. Stkhldr	References and Links for more information	
Supportive Programming	Information Disclosure	Eco-labelling of Farm Products			
		Example 1: Labels that identify local or organic produce that generates fewer air emissions	Federal, Provincial	Local Food Plus Sustainable Label, Ontario http://www.localflavourplus.ca/	
	Promotion and Awareness	Educational material for farmers that provides an overview of issues related to emissions			
		Example 1. Public education and outreach programs that provide information on ammonia control options for crop production	All		
	Development of Codes of Practice and Tools	Develop Codes of Practice to reduce emissions from the agricultural sector			
		Example 1. Code of Practice to minimise soil erosion by measures such as shelterbelts (hedges or walls), strip cropping, soil cover, appropriate tilling, cover crops, surface fixation with synthetic stabiliser or liquid manure	Federal, Provincial		
		Example 2. Code of Practice to reduce emissions from livestock housing	Federal, Provincial		
Example 3. Code of Practice to reduce VOC emissions from manure management systems		Federal, Provincial	Action Plan for Reducing Ammonia Volatilization from Agriculture http://www.sns.dk/Landbrug/vandmpl2/AMMO NIA%20Action%20Plan%20-%20UK%20Final%20translation231001.pdf		
Capacity Building	Support farm energy audits to identify cost effective emission reduction opportunities				