Policy Strategies and Options

Draft Background Paper for Discussion

Prepared for the

NERAM/AIRNet Colloquium on Strategies for Clean Air and Health

November 5-7, 2003.

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1.0 Introduction

A wide variety of gases and particles in ambient air have been directly or indirectly linked to adverse effects on human health. Ground-level ozone, NO_2, and PM_{10} and some related PM fractions seem to be major components in this respect and their ambient levels appear to be associated with a variety of adverse health effects ranging from respiratory symptoms and complaints to enhanced morbidity and premature mortality with cardiac and respiratory causes. Both short-term and long-term exposures to these pollutants appear to have substantial adverse health consequences. Even though the relative risks may be considered as relatively small, there is a serious public health problem because of the large number of people exposed and the existence of specific subpopulations that are at increased risk. Much attention nowadays is focussed on ambient PM. For PM_{10}, $PM_{2.5}$ and other particulate fractions in particular much is still unknown about their health-relevant particle size fractions, the chemical or biological components and their respective sources that might be most responsible for health effects. In addition there are also limitations in the toxicity data that can help explain the health effects as observed at relatively low particle levels and/ or provide a view on biologically plausible mechanisms of action. Studies on the contribution of sources and on transport phenomena indicate that many of the emissions and their transport routes are to a large extent transboundary and abatement strategies have therefore to be internationally oriented. Abatement policy to reduce acidification and related effects has therefore international (UN, WHO, EU, USA) as well as national aspects.

This background paper provides an overview of the current state of air pollution policy approaches in Europe and North America. The paper identifies general approaches for air quality management and provides examples of strategies and options at the national, regional and local level. The paper discusses AIRNET and NERAM initiatives to identify issues and challenges faced by policymakers and other stakeholders in developing air quality management approaches as a step towards improving the linkage between information needs, research priorities, and effective policy decisions.

2.0 Emission reduction policy and target groups

In 1979 the Convention on Long-Range Transboundary Air Pollution (CLRTAP) of the UN Economic Commission for Europe (UN-ECE) was established. The aim of this Convention is to limit and, as far as possible, to gradually reduce and prevent air pollution including long-range transboundary air pollution. Parties to the Convention negotiate to reduce national emissions of air pollutants such as sulphur dioxide, nitrogen oxides, ammonia, volatile organic compounds (VOCs), heavy metals and persistent organic pollutants (POPs).

By the end of 1999 the UN ECE has established emission limits for the year 2010, the so-called Gothenburg Protocol. The EU processed the setting of emissions limits by the member states and adopted the National Emission Ceiling (NEC) guideline. For example for the Netherlands the NEC ceilings are close to or slightly lower than those of the Gothenburg Protocol (see Table 2.1).

Table 2.1 Emission and reduction targets in the Netherlands

	Emissions in 1990 (in 10^6 kg)	**Emission targets in 2010 (in 10^6 kg)**		**Emission reductions in 2010 (in %)**	
		NEC (EU)	**NMP4**	**NEC (relative to 1990)**	**NMP4 (relative to 1990)**
SO_2	231	50	46	78	80
NO_x	579	260	231	55	60
NH_3	202	128	100	37	50
VOC	500	185	155[1]	63	69

[1] Including EU guidelines for VOC-containing products and motorized 2-wheel-vehicles; otherwise the target is 163 million kg.

3.0 EU and UN ECE air pollution and health policy

Besides policy targeted to emission abatement, the EU also adopted in 1996 the Air Quality Framework Directive and is establishing Air Quality Limit Values. Of the related Daughter Directives for a number of pollutants the 1st one was adopted in 1999 and addressed PM, NO_2, and Pb (EC 1999a). The 2nd Daughter Directive included CO and benzene, and the 3rd one ozone, being adopted in 1999 (EC 1999b). This EU Directive approach includes both source-risk chain analyses for a number of compounds as well as the related implementation of monitoring and legislation of compliance to the limit values. Air Quality Guidelines established by the WHO (1986, revised in 2000) form the health basis for setting the limit values by the EU (see overview in Table 1.2). These new values intend to provide increased protection in the population against a wide range of health effects.

Very recently, the EU has initiated the Clean Air For Europe (CAFE) program to further strengthen their air pollution control policy based on the best available science and created in a broad, open, and transparent dialogue with the scientific community, as well as with the public and the stakeholders. The objective of CAFE is to review existing limit values, emission ceilings, and abatement protocols, as set out in the current legislation (including the position of the EU as Party to the UN-ECE Convention on LRTAP). In addition, CAFE will develop flexible mechanisms for gathering and dissemination of information, identify where there may be a need for additional measures to reduce emissions from specific sources, and propose an update-strategy for air quality objectives and cost-effective measures.

Table 3.1 EU Limit Values for nitrogen dioxide, particulate matter, and ozone, as set in the 1st and 3rd EU Daughter Directive

Substance	Averaging period	Limit Value	Date limit value has to be met
Nitrogen dioxide	1 hour	200 μg/m^3 NO_2 , not to be exceeded more than 18 times a calendar year	1 January 2010
	Calendar year	40 μg/m^3 NO_2	1 January 2010
Particulate matter (PM_{10})	24 hours	50 μg/m^3 PM_{10} , with a maximum number of days per calendar year with exceedance)	1 January 2005 (max 35 days)
			1 January 2010 (max 7 days)
	Calendar year	40 μg/m^3 PM_{10}	1 January 2005
	Calendar year	20 μg/m^3 PM_{10} (indicative)	1 January 2010
Ozone	Maximum daily 8-hour mean	120 μg/m^3 O_3 , not to be exceeded on more than 25 days per calendar year averaged over three years	1 January 2010

The EU air quality objectives for PM_{10} may seem stricter than the USA air quality standards, though direct comparisons are difficult due to the differing forms of the standards. In the USA, the current PM_{10} standard for 24-hours is 150 μg/m^3, based on the 99th percentile of monitored data over a 3-year period; the current PM_{10} annual standard is 50 μg/m^3, averaged over a 3-year period. The USA $PM_{2.5}$ standards tend to be the controlling standards in much of the US; these standards are, for 24-hours, 65 μg/m^3, based on the 98th percentile of monitored data over a 3-year period, and the annual standard is 15 μg/m^3, averaged over a 3-year period.

In the EU, the PM_{10} air quality objectives result in the need for reductions in emissions from various sources to a much greater extent than formerly anticipated.

4.0 Regulatory Review of US and EU PM Standards

The PM standards are now under revision in both the USA and the EU following a critical review of data from new studies on exposure, air quality, emission and source apportionment, PM toxicity and adverse health effects. In particular, the EU will also consider whether the PM Daughter Directive should also be adjusted to control for the fine fraction of $PM_{10,}$ i.e. $PM_{2.5,}$ or for a more source-related PM fraction including combustion-related (primary) particles. The EU CAFE Working Group on PM released in August 2003 the draft of the 2nd Position Paper on PM. In the USA the Air Quality Criteria Document for PM is nearing completion. This document summarises the state of the science for particulate matter and serves as the science reference document for regulatory evaluation. A first draft of the Staff Paper, wherein the interpretation of the scientific data and recommendations for revisions to the standards, if warranted, occurs was released in late August, 2003. The regulatory review for PM, therefore, is well underway in the USA. While it is not clear what revisions, if any, will occur to the $PM_{2.5}$ standards, it is clear that in the USA the PM_{10} standards will be replaced by a new $PM_{10-2.5}$ standard for the coarse mode fraction of inhalable PM.

While the existing process of setting regulatory air quality standards or limit values is necessary and important, the scientific basis for setting policy is not clear due to the extensive uncertainties. For example:

- It is not clear which components of the air pollution mixture are responsible for health effects.
- It is not clear which sources of air pollution are most damaging to human health.
- There is no single "correct" approach to modelling ambient PM-health effects associations that will provide the "right" answer with regard to precise quantification of PM effect sizes for different health outcomes.
- The extent to which air quality models can accurately predict ambient regional and local levels of air pollution is weak.
- Air modelling of long term effects presents difficulties, apart from the additional input data requirements, running a model for a year quickly becomes cost prohibitive.

The many uncertainties seriously complicate health risk assessment and standard setting as well as make it difficult to identify the most cost-effective and health-beneficial emission and risk controls. Ideally such strategies should be targeted on responsible components, related to the most important sources and emissions, and resulting in exposure and health reduction. Source-effect chains should therefore be carefully analysed and modelled to quantitatively link emissions to effects and to evaluate alternative control strategies to possibly reduce exposure and health risks.

5.0 Guidelines for Air Quality Management Strategy Development

Guiding principles for the development of air quality management strategies have been published by the World Health Organization (1999) and The World Bank Group (1998). The goal of air quality management, according to WHO, is

> "*to maintain a quality of air that protects human health and welfare. This goal recognizes that air quality must be maintained at levels that protect human health, but must also provide protection of animals, plants (crops, forests and natural vegetation), ecosystems, materials and aesthetics, such as natural levels of visibility. And to achieve this air quality goal, it is necessary to develop policies and strategies."(WHO 1999).*

Urban air quality management requires an integrated approach that determines which are the most serious problems; identifies the measures that offer cost-effective and feasible solutions across a range of economic sectors and pollution sources, and builds a consensus among key stakeholders concerning environmental objectives, policies, implementation measures, and responsibilities (World Bank Group, 1998).

Development of an air quality management strategy includes the following activities:

- Use of monitoring and modeling to establish an emissions inventory of key pollutants and emissions sources
- Use of dispersion modeling to determine the impacts of emission on ambient concentrations

- Use of dose-response functions and valuation techniques to estimate the impacts of pollutants on human health
- Identification of technically feasible abatement options and estimation of their costs
- Determination of priority measures with high benefit cost ratios

The WHO Guidelines for Air Quality (1998) identify the following suite of air quality management options:

Table 5.1. Strategies for Air Quality Management (based on WHO, 1998)

Policy Strategy	Tactics
Control of Point Sources	• Siting and planning • Source emissions reduction • Management and operational changes • Process optimization • Combustion modifications • Fuel modifications • Emissions control
Control of Mobile Sources	• Cleaner fuels • Traffic management • Incentives to Develop and Use Public transportation • Restrictions on motorized traffic • Vehicle inspection and maintenance programs • Vehicle retirement and scrappage programs • Exhaust emission controls • Land use planning
Control of Area Sources	• Technical strategies (cleaner production and pollution prevention technologies and best practices) • Regulatory strategies (legal enforcement) • Educational strategies • Market based strategies (financial incentives for cleaner fuels etc.)

Unless legal constraints in a country prescribe a particular control option, the evaluation of control options must take into account technical, financial, social, health and environmental factors, as well as the speed with which they can be implemented and whether they are enforceable. Methodologies for evaluating air pollution control strategies have been developed for use in metropolitan areas (WHO, 1998). For example, the criteria in Table 5.2 were used by the Southern California Air Resources Board in evaluating their 2003 air quality management plan control measures (SCAQMD, 2003).

Table 5.2. Criteria for Evaluating 2003 AQMP Control Measures

Criteria	Description
Cost Effectiveness	The cost of a control measure to reduce air pollution by one ton (cost covers obtaining, installing, and operating the control measure).
Efficiency	The positive effects of a control measure compared to negative effects
Emission Reduction Potential	The total amount of pollution that a control measure can actually reduce.
Enforceability	The ability to force polluters to comply with a control measure
Equity	The fairness of the distribution of all the positive and negative effects among various socioeconomic groups
Legal Authority	Ability of the District or other adopting agency to implement the measure or the likelihood that local governments and agencies will cooperate to approve a control measure
Public Acceptability	The support the public gives to a control measure
Rate of Emission Reduction	The time it will take for a control measure to reduce a certain amount of air pollution
Technological	The likelihood that a technology for a control measure will be available as anticipated.

6.0 Identifying Issues, Research Needs, and Policy Directions for Improving Air Quality in the EU and North America

The NERAM International Colloquium Series was launched in 2001 to assist in bridging the gap between science and policy to improve air quality policy decisions and public health. At the first NERAM Colloquium, multi-stakeholder break out groups including researchers, regulators, industry representatives and policy makers identified ten priority research theme areas that, if addressed, would provide a more informed basis for air quality policy decision-making. These research themes emphasized the need for research across a broad range of disciplines including epidemiology, toxicology, risk analysis, risk communication, social sciences, economic analysis, and policy evaluation (Maynard et al., 2003a). In addition, a number of issues and considerations for future air quality policy development were discussed. In his keynote address, Dr. Robert Maynard of the UK Department of Health indicated that while air quality standards have played a central and useful role in regulating air pollutants, the findings of key epidemiologic studies (Dockery, et al., 1993; Pope et al., 1995; Krewski et al., 2000) suggest that standard setting on the basis of mass loading (PM_{10}, $PM_{2.5}$, etc.) is likely a suboptimal strategy for management of particles. He challenged policymakers to re-think current approaches and look towards developing innovative air quality management strategies. Maynard noted that to devise optimal, cost-effective strategies for controlling particulate air pollution, regulators need a better understanding of the composition of the mixture, the sources of the various components, the effects on health of the various components and benefits likely to accrue from their reductions, and the costs of reducing the various components. He noted that the role of co-pollutants and climate also needs to be well understood. Maynard offered the following considerations for future policy directions:

- air pollution risk management policy should be focused on reductions that offer the greatest benefit per unit cost of reduction.
- targeted risk communication can aid susceptible populations provided that the advisories are practical.
- recent developments in the fields of environmental justice and equity should be taken into account in policy development.
- policies designed to reduce levels of air pollutants will have a profound effect on how we live, travel, and work in the future. Effective communication between researchers, policy workers and the public will be essential for acceptance of such policies.
- any policy developed to improve health should be amenable to monitoring so that the extent to which there are improvements in health can be measured

Maynard emphasized that air pollution control policies may have wide-ranging effects which need to be studied carefully and fully. He suggested that clinical observation of susceptible subgroups, such as those suffering from asthma and cardiovascular disease may provide the earliest and clearest indication of whether air quality policies are resulting in measurable population health benefits (Maynard et al., 2003b). The Health Effects Institute Health Accountability Working Group has identified the continually changing regulation of air pollution in the United States, Europe and elsewhere as an opportunity for research at the national, regional, and local scales to assess the extent to which policy initiatives improve public health. The following US air quality initiatives were among those proposed for evaluation research (HEI, 2003):

- US EPA Heavy Duty Diesel/Low Sulfur Fuel Rule to reduce heavy-duty diesel-vehicle emissions via reductions beginning in 2006 and 2007 in fuel sulphur content and emission control technologies (eg. particle traps and various nitrogen oxides (NOx) reduction technologies
- $PM_{2.5}$ and Ozone National Ambient Air Quality Standard (NAAQS) State Implementation Process

In the absence of scientific certainty in all of the key areas underlying policy development, governments at the national, regional and local levels are faced with the challenge of devising and implementing policies and interventions to improve air quality. The purpose of the AIRNET/NERAM 2003 International Conference on Strategies for Clean and Health is to identify effective policy solutions to improve air quality and health considering state of the art science on population exposure and health effects, air quality modelling and policy analysis tools. As an outreach effort and to better understand the scope of current air quality policy initiatives, NERAM conducted interviews with quality managers in the automotive industry, in an Ontario municipality located in one of the smoggiest regions in Canada, and at the regional level in the state of California. This effort was supported by a web search to identify air quality initiatives in a variety of

jurisdictions including: Government of Canada, Province of Ontario, City of Toronto, City of Mississauga, and UK – City of London. Policy options addressed several areas: i) air quality standards, ii) vehicle emissions controls, iii) traffic management and traffic demand management strategies, iv) cleaner fuel initiatives, v) emission limits for power plants and other industries, vi) energy conservation initiatives, vii) education and communication, and viii) transboundary agreements. These initiatives are summarized in Appendix A Table A-1 to provide an idea of the scope and interconnectedness of policies at the various levels of government

A number of views and perspectives on current approaches, challenges, and future directions for air quality policy setting were identified through the interviews. The need for strategies to target emissions from older vehicles was commonly identified as a priority.

Automotive Industry Perspectives

- *vehicle emissions controls on new vehicles are very stringent. The problem is with emissions from older, poorly maintained vehicles. We have reached the point of diminishing returns whereby it will become so expensive to remove the remaining emissions it is becoming less cost-effective*

- *emission inventories are not accurate and it is expensive to test emissions on millions of vehicles. 60% of air emissions are from 10 % of the vehicle pool. Inventories are even worse for off road vehicles.*

- *the automobile manufacturing industry is driven by concerns over global warming and sustainability. The industry is trying to improve fuel economy to address global warming and introduce diesel vehicles with tightened emission controls*

- *In the longer term, research is continuing to develop hybrid vehicles and fuel cells. The biggest deterrent is cost. It is important to look at air quality management from a systems approach rather than decreasing emissions just for the sake of it. Resources are finite and we need to base decisions on cost-benefit analysis. We need toxicity data to demonstrate the existence of health effects at prevailing levels. There are many uncertainties in the epidemiological studies, such as the effect of seasonality and model specification. We are approaching background ambient levels, so that further reductions will be difficult to achieve.*

Municipal Air Quality Management Perspective

- *Our anti-idling pilot project (2001-2002) involving schools, train stations, municipal facilities and gas stations was very successful. City idling policies and practices were also developed. Print and electronic media coverage of the campaign reached over 12 million readers/listeners/viewers. Public feedback to the Campaign was analyzed and proved very positive. The success of the communications initiative is now being replicated by municipalities and community environmental organizations in the GTA, parts of Ontario, Canada and the United States. Reducing engine idling is a first-step that may leverage more significant lifestyle and behavioural changes with co-benefits to improve human health and the environment; e.g., energy efficiency retrofits in homes to save fuel costs and reduce fossil fuel emissions.*
- *Partnerships are important in making policy changes to improve air quality e.g. Air Quality Advisory Committees, NGOs, GTA Clean Air Council, Federation of Canadian Municipalities*
- *It has taken many years to realize the overlap between the smog and climate change issues. The sources are the same.*

South Coast Air Quality Management District

- *The air pollution problem is so severe that all sources have to be addressed through a multi-pronged strategy. The emissions inventory is important in understanding the relative contributions of various sources and establishing emission control strategies*
- *Public education is important in maintaining support for air quality management initiatives*
- *The driving force for regulating stationary sources is the State and Federal standard for ozone and PM.*
- *We have found that flexible, market based approaches are more cost- effective that a command and control approach*

- *We realized that even though we have the most stringent rules in the US we are finding ways to make additional emission reductions by thinking outside of the box.*
- *The relative contribution of stationary sources has been shrinking (less than 20% of total emission). 80% of the problem is mobile sources.*
- *We have a 3 pronged system including state, federal and local agencies*
- *We need a more aggressive strategy to address mobile source emissions. New vehicles are quite clean. The problem is with the existing fleet of 10 million vehicles (that don't rust), Pre '92 year model vehicles are responsible for more than 25% of vehicle units traveled but more than 75% of overall emissions*
- *We need the political will to regulate incentives and accelerate fleet turnover*
- *Consumer products are responsible for 120 tonnes VOCs/day and are difficult to address*
- *We need stronger federal regulation of emissions from ships, trucks and trains. This is a key area where international co-operation is required.*
- *We need to take a serious look at how vehicle manufacturers design truck engines*
- *The environmental justice concept is important in setting policy in California*
- *The keys to setting to effective policies are – involving stakeholders from the start in an open transparent process; relying on good science as the basis for decisions; providing flexible compliance alternatives; exploring least costly approaches*
- *A major gap in science for policy decisions is the identification of the most harmful component of particulate matter. Also air quality modeling tools are not at a level of sophistication to guide regulatory approaches to $PM_{2.5}$*
- *Jurisdictional issues are sometimes a barrier. The fragmented structure of responsibilities is not always helpful. All partners, local, state and federal need to be part of the solutions.*
- *More funding for research on air quality modeling and engine technologies is needed*
- *Fuel cell technology is the solution for California and the rest of the world.*

With respect to air pollution and health frequently a number of scientific and policy- oriented questions are brought forward into the discussions (see Conference Concept Document). AIRNET has organised, through a questionnaire, an EU-broad stakeholder polling survey to identify research and policy frequently asked questions (FAQ's). These FAQ's will further structure the AIRNET work groups final end-reports. The results of this AIRNET EU Stakeholder Polling will be presented at the Conference.

The AIRNET/NERAM 2003 Conference offers the forum to discuss the science-policy-stakeholder interface and interplay with a large number of highly interested and qualified people from North America and Europe. The output of this conference is intended to provide more precise answers to the science-policy strategy-oriented questions and to identify the most important gaps in knowledge which could reduce the uncertainties in decision-making and receive broad policy and stakeholder support.

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APPENDIX A

Table A-1. Examples of Air Quality Management Strategies in North America and Europe

	Air Quality Standards	Emissions Control	Land Use	Vehicle Emissions	Traffic Management	Traffic Demand Management	Fuel Quality	Energy	Education and Communication	International Air Quality Management
Government of Canada	**Canada wide standards for fine PM and ozone** to be achieved by 2010 **Canada wide Acid Rain Strategy Post 2000** to achieve a 50% reduction of SO_2 below the existing Countdown Acid Rain cap by 2015	**Federal Agenda to reduce VOC emissions from the use of Consumer and Commercial Products.** Notice of Intent in Canada Gazette 1 in summer/fall 2003. Actions to be implemented 2003-2010.		**On-Road Motor Vehicle Emissions Regulation** will be phased in on Jan. 1 2004 and will reduce the allowable emission levels from new on-road vehicles by up to 95%. **Regulations for Off-Road Engines** will establish emis-sions standards for 2005 and later model year engines typically used in tools and small machines. By 2025 the proposed regulations will result in a 44% reduction in combined halocarbons (HC)+ nitrogen oxides (NOx) emissions. Regulations for off-road diesel engines are scheduled to be proposed in Canada Gazette Part 1 this fall. The planned regulations will establish		**Government of Canada Employee Transit Pass Pilot Project** Nov. 2002-2003. **Transport Canada Transit Studies** to examine the investments and demand management measures required to attain transit ridership and modal share targets in the National Vision for Transit to 2020. Transport Canada is working with Infrastructure Canada to establish 10 year infrastructure program with provinces and municipalities to place greater emphasis on public transit in existing and future infrastructure funding.	**Sulphur in Diesel Fuel Regulations** set a maximum limit of 15 ppm sulphur for on-road diesel fuel starting in 2006, a 97 percent reduction relative to the current maximum of 500 ppm.	**CEPA National Emissions Guidelines for Coal, Oil and Gas Fired Power Plants** were published in Canada's Gazette Part I in Jan. 2003 setting more stringent limits for emissions of smog-forming sulphur dioxides, nitrogen oxides and particulate matter, based on the performance of current best available economically feasible technology.	Financial support for **20/20 The Way to Clean Air in the GTA,** promoting individual behavioral change to achieve a 20% reduction in transportation and energy use. Contribution to Implementation of an Improved **Air Quality Index** Contribution to study with Toronto Public Health on Air Quality and Weather Links to Mortality Risks	**Canada-US Air Quality Agreement Ozone Annex**

	Air Quality Standards	Emissions Control	Land Use	Vehicle Emissions	Traffic Management	Traffic Demand Management	Fuel Quality	Energy	Education and Communication	International Air Quality Management
Government of Canada				Canadian emissions standards for off road compression ignition engines aligned with the US Tier 2 and Tier 3 standards. Environment Canada plans to align with the US EPA Tier 4 standards once they are finalized.						
Province of Ontario	**General Air Pollution Regulation 346** updated to include point of impingement limits for 18 high priority pollutants	**Ontario's Clean Air Plan for Industry (CAPI)** The Ministry of the Environment will continue to consult on and develop its plan to limit NOx and SO2 emissions from seven industrial sub-sectors: cement, iron and steel, base metals, petroleum, pulp and paper, glass and carbon black.	**Smart Growth** The government will continue to implement Ontario's *Brownfields Statute Law Amendment Act, 2001* and the *Oak Ridges Moraine Conservation Act, 2001* and Oak Ridges Moraine Conservation Plan. The brownfields legislation will encourage the cleanup and redevelopment of brownfields abandoned, underused or contaminated lands.	**Drive Clean Program Expansion**. In 2003, proposed improvements to the heavy duty components of the Drive Clean inspection and maintenance program, including tightening emission standards for all diesel heavy-duty vehicles for 2004 and in 2005, tightening emission standards for diesel school buses, and phasing in an incentive for vehicle owners to surpass standards. The proposed improvements would result in		**SuperBuild Provincial Transit Investment Plan**: $3.25 billion over ten years for Provincial Transit Investment Plan, including $67 million over two years towards new GO Transit Bus Rapid Transit network	**Tax Rebate Program for Vehicles Powered by Alternative Fuels** In its 2003 Budget, the Ontario government announced that it would double to a maximum of $2,000 its retail sale tax rebate for qualifying alternative fuel vehicles. This announcement builds on the 2002 Ontario Budget for clean air when the government announced an exemption for bio-diesel	**Incentives for New Clean Capacity for Ontario** Incentives to support the development of alternative and renewable electricity generation. equipment. **New Clean Power** Ontario is investigating new sources of clean power, including working with Manitoba and the federal government on the possibility of bringing hydro-electric power into Ontario from	**Air Quality Index.** In 2002 fine particulate matter was added to AQI. **Sulphur-in-Gasoline Reporting Regulation** (O.Reg. 212/02) which requires refiners and importers to report the average sulphur content in gasoline on a quarterly basis. **Smog Advisory Air Quality Index (AQI) Stations and Reports** The Ontario government is operating a new air monitoring station in Belleville, bringing the number of stations in the Ontario AQI network to 37. The Ontario government	Support for 'US EPA NOx SIP Call-related litigation Support for Canada/US Air Quality Agreement Ozone Annex

	Air Quality Standards	Emissions Control	Land Use	Vehicle Emissions	Traffic Management	Traffic Demand Management	Fuel Quality	Energy	Education and Communication	International Air Quality Management
Province of Ontario		**Volatile Organic Compounds (VOCs) Codes of Practice** As part of the Clean Air Plan for Industry, the Ontario government is developing a plan to achieve an overall 45% Ontario reduction for VOCs. **Advancing Smog Reduction Target Deadlines** The Ontario government has proposed to advance the target date for NOx and SO2 reductions from 2015 to 2010. **Selected Targets for Air Compliance Program (STAC)** Ontario will continue to work with emitters to ensure compliance with the General Air Pollution Regulation.		Ontario having the strictest emission standards for big trucks and buses in North America. Smog Patrol staff has increased to 30 full time positions. The Drive Clean Program reduced smog-causing vehicle emissions in the GTA and Hamilton by 15.2 percent (1999-2001). Fleet Management Best Practices. Ethanol blended gasoline is used where it is commercially available and competitively priced. The government continues to purchase and evaluate the use of hybrid vehicles, and continues to revise its passenger fleet vehicle policy, including the existing anti-idling policy.			fuels from the 14.3 cents per litre fuel tax and an extension of the sales tax rebate for hybrid-electric automobiles to cover sport utility vehicles and light trucks. **Alternative Energy and Fuel Strategy** that will be structured around key themes from the report fo the all-party Select Committee on Alternative Fuel Sources. **Tax Credit for Fuel Conservation**Provides a maximum of $100 tax credit to people who buy, rent, lease or import new passenger cars that use less than 6 litres of gaso-line or diesel fuel per 100 kilometres of highway driving. Does not apply to SUVs.	northern Manitoba. The Ministry of Energy is undertaking an independent study to evaluate the feasibility of the Beck 3 generating project in Niagara Falls, and Ontario Power Generation has been directed to accelerate its assessment of the proposed Portland natural gas generating station in Toronto. **Reduction of Electricity Use** The Ontario government continues to offer a retail sales tax rebate on energy-efficient household electrical appliances that meet ENERGY STAR® requirements.	has also increased the number of times per day an AQI report is released – including weekends and holidays – to a total of seven. **Mandatory Monitoring and Public Reporting Regulation** The Ontario government will continue to post reports on Ontario's new online emissions reporting registry, OnAIR, which will make polluters more accountable to the public by providing regular information about what emissions are being put into the air and by whom. **Smog Alert Response Program** The Ontario government will continue to operate the provincial Smog Alert Response Program (SARP) and will provide the public and the Ontario Public Service with the information required to take appropriate action to reduce their contribution to smog formation.	

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Province of Ontario		**Emissions Reduction Trading** came into effect on Jan. 1, 2002. The electricity sector caps will reduce emission limits for nitrogen oxides (NOx) by 53% and sulphur dioxide (SO2) by 25% by 2007. Ontario's Emissions Trading regulation extends to Independent Power Producers (IPPs) in 2004. **Continue Implementing the Lakeview Regulation** The Ministry of Environment will continue to oversee the implementation of the Lakeview Regulation to ensure that the station complies with emission limits and ceases to burn coal by April 2005.						**Closing Coal-Fired Power Stations** The Ontario government will continue to work toward a target of phasing out the use of coal-fired power plants no later than 2015. The Ontario government will contribute $20 million over five years to establish a new Centre of Excellence for Electricity and Alternative Energy Technology		

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City of Toronto **City of Toronto**			**City of Toronto Official plan** to integrate land use and transportation by developing a pattern of growth that is supportive of transit, bicycling and walking Urban Forest Planting and Maintenance	**TTC Anti idling policy** since 1993. TTC vehicles annually tested and compliant with provincial Drive Clean program TTC uses low-sulphur diesel fuel. TTC evaluating hybrid bus technology **Anti-idling bylaw**		Better transportation partnership GTA transportation Demand Management Carpooling program for employees Adoption of City Cycling Master Plan Trail and Path extensions and creation of new trails and paths	Purchase of on-road diesel for City's off-road diesel fleet. SO2 emissions from the City's corporate fleet have been reduced from 29.5 tonnes per year in 1999 to about 6 tonnes per year in 2003. The City has paid about 1% more each year for fuel. Green Fleet Transition Plan Encourage other large organisations within the City to implement a low-sulphur fuel corporate purchasing practice	**Better Buildings Partnership** Public-private partnership to promote and implement energy efficient retrofits of existing commercial, institutional, and multi-residential buildings. Purchase of Green Power (25%) of total Promote energy conservation at household level Promote energy conservation year round within the corporation through Corporate Smog Alert Response Plan. Sustainable Energy Plan for Toronto Toronto Atmospheric Fund funded projects to reduce GHG emissions (Greensaver Home Rewards Program)	**Corporate Smog Alert and Heat Alert Action Plans** Air quality data collection, analysis, monitoring, modeling, reporting Development of comprehensive air quality strategy Policy and Research support Participant in GTA 20/20 The Way to Clean Air to promote a community wide 20% reduction in vehicle and energy use Expansion of health messaging to increase awareness of the AQI Study with Health Canada, Environment Canada and Toronto Public Health on Air Quality and Weather Links to Mortality Risks	Support USEPA in legal action against U.S. coal fired plants

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City of Mississauga		**Inventory of energy use and emissions** completed and Local Action Plan to reduce GHG being developed for corporate operations and the community	**Integrated Turf Management program** Identify opportunities to intensify neighbourhoods Erosion and Sediment Control By-law Natural areas survey	Fleet vehicles (buses, heavy-duty) emissions testing Mississauga Anti-idling Public Awareness Campaign		Adoption of Transit Strategy Expanded Mississauga Transit service Multiple Use Recreational Trail Network master plan	Low sulphur fuel used for on-road and off-road fleet and equipment	**Local Action Plan** to reduce greenhouse gas emissions	**Mississauga Air Quality Advisory Committee** reports to Council Air Quality Action Plans since 1999 Smog Alert Response Plan since 2001 Mississauga Anti-idling Campaign Participant in 20/20 The Way to Clean Air Partnership with Toronto Public Health	
UK – City of London	Mayor to urge the government to seek more stringent National Emissions Ceilings for the UK in the next round of negotiations, where practicable and cost-effective	Mayor to urge Environment Agency to ensure that there are no breaches of process emissions limits from Agency regulated processes. Mayor to urge London boroughs to inspect their regulated industrial processes and to modify and update their permit conditions, as and when require and to act upon complaints and suspect-	Mayor to encourage use of appropriate methods for assessing the environmental performance of buildings, both commercial and large residential blocks. Mayor to encourage London boroughs to ensure that Unitary Development plan policies incorporate borough air quality action plan and local air quality strategy	Provide information on technologies for cleaner road vehicles tailored to different operator types. Undertake investigations and trials of new technologies within functional body fleets. Mayor will urge the government to increase the retrofitting grants towards 100 per cent to encourage smaller operators to use the grants. Major to work with Hydrogen partnership to develop and	Mayor will develop and implement traffic management measures to help reduce emissions and energy use. Mayor to assist in development and implement-ation of proposals for effective distribution of goods in London. Mayor to	Major to work with partners to identify options for increasing both rail and water freight.	Mayor to revise legislation to improve the quality of fuel used by river vessels ahead of EU legislation. Mayor will encourage use of alternative fuels by providing incentives for the very cleanest vehicles. Mayor will seek to extend the use of water diesel emulsion across London buses.	Mayor will work with energy supply companies to increase the provision of renewable electricity. The GLA group will procure renewable energy for the energy supply to their buildings and services. Mayor will encourage efficient local energy generating schemes, particularly combined heat and power and	Review adequacy of air quality monitoring	Mayor to request that government and EU take measures to achieve the reduction of emissions that contribute to long range pollution affecting London – particularly for key ozone and secondary particles precursors such as NOx, SO2 and VOCs.

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UK – City of London		ed or actual breaches of permit conditions in a timely manner. Major to urge London boroughs to ensure that process emissions do not lead to exceedances of the national air quality objectives and to use regulatory or other measures, as appropriate to reduce these emissions. Mayor to improve information on emissions from construction-related activities and include them in London Atmospheric Emissions Inventory in 2003. Mayor to build on work of other organizations to develop construction best practice guidance to	measures Mayor to encourage London boroughs to include policies that set out best practice aspects of design, orientation, density and location of buildings to minimise energy demand, optimise sustainability and minimise the impact of air pollution and noise inside buildings. Mayor will expect London planning authorities to ensure air quality is taken into account along with other material considerations in making decisions on development proposals.	implement and hydrogen action plan. Mayor and Transport for London to encourage the government and TransportEnergy to investigate additives and devices aimed to reduce NOx, PM10 and CO2. Mayor to provide support and framework for vehicle maintenance campaign. Mayor to raise awareness of issue of idling vehicles. Mayor will give high priority to further reductions in bus emissions. All new buses will have Euro III engines or better and will be fitted with particulate traps by 2005. All existing buses will have Euro II engines and will be fitted with particulate traps by 2005. Two year trials of zero emission buses operating on hydrogen fuel cells with start	assess scope for the use of priority lanes by freight vehicles and impli-cations of other road users, primarily cyclists. Mayor will con-sider the London Low Emission Zone Feasibil-ity Study.			community heating schemes. Mayor will also encourage use of gas condensing boilers and low NOx burners in boilers. Mayor encourages the use of renewable energy technologies and hydrogen as a fuel in London, as part of a move to establish widespread use of low and zero-emission sources of heat and power.		

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UK – City of London		encourage the reduction in levels of dusts, together with other environmental impacts, from construction-related activities. Mayor will encourage London waste authorities to promote composting, which should also help to reduce the number of bonfires. Mayor will propose that the government consider further national and international measures and mechanisms to reduce emissions of NOx and PM10 to assist in achieving the national air quality objectives in London.		in 2003. Mayor will ensure that from set dates all taxis are first Euro I standard or better, and later Euro II standard or better. Mayor will seek to ensure when awarding new waste and recycling contracts that all waste authorities specify emissions criteria for the vehicles used. Mayor to actively pursue the reduction of emissions at airports, particularly at Heathrow. Mayor to encourage passenger and freight training operating companies to investigate methods for reducing emissions from diesel trains Mayor to work with other organizations to assess ways of further improving air quality on the London Underground system						