



THE REGIONAL MUNICIPALITY OF HALTON

Report To:	Chairman and Members of the Health and Social Services Committee
From:	Bob Nosal, Commissioner & Medical Officer of Health
Date:	February 12, 2007
Re:	Air Quality, Human Health and the Built Environment: Protecting Air Quality through the Land Use Planning Process
Report No.:	MO-12-07

RECOMMENDATIONS

1. THAT the 2007 Health Department Operating budget be increased by \$50,000, funded by a transfer from the Tax Stabilization Reserve, to develop a community-wide air quality modelling program that can be used to assess air quality across the Region, evaluate the contribution of new emission sources on air quality, and inform land use planning decisions, policy development, and health promotion campaigns.
2. THAT the Region examine the portable air monitoring equipment and/or resources that could be used to assess air quality in micro-environments such as traffic corridors and validate air quality modelling results, to support land use planning decisions and policy development.
3. THAT the Region, in collaboration with the local municipalities, examine the policy instruments that might be used to support the development of “complete communities” that reduce reliance on automobiles in order to reduce vehicle-related emissions of air pollutants and greenhouse gases across the Region.
4. THAT the Region, in collaboration with the local municipalities, explore the policy instruments that might be used to encourage the early application of the EnerGuide 80 standard to small residential buildings, the application of LEED™ standards to large buildings, and the use of alternative or renewable energy systems in new buildings.
5. THAT the Region develop and implement a health promotion program that educates the public about the link between air quality, human health, climate change, and the built environment, and about the actions that can be taken by individuals, organizations and governmental agencies to improve air quality and/or retard climate change.
6. THAT the Regional Chair send a copy of this report and the policy paper, “Air Quality, Human Health and the Built Environment” to the Ontario Ministers of the Environment, Municipal Affairs, and Health and Long-term Care, the Chief Medical Officer of Health, all Medical Officers of Health in Ontario, the Association of Local Public Health Agencies, the Ontario Public Health Association, the Canadian Institute of Public Health Inspectors, and the Association of Supervisors for Public Health Inspectors – Ontario.

REPORT

Purpose

The purpose of this report is to inform Council of the key elements contained in the Health Department's policy paper, *Air Quality, Human Health & the Built Environment*. The policy paper has been prepared to inform the long-term planning process. It also addresses Goal #9 in the 2004-2006 Strategic Plan which requires that the Region: "Work to improve air quality in Halton, in cooperation with other orders of government, business and the community." The policy paper is found under separate cover in this cycle's agenda.

The policy paper builds on a number of corporate and community initiatives that have been undertaken by the Region over the last several years. It summarizes the health impacts associated with poor air quality, discusses how the built environment can impact on air quality, and identifies the actions that can be taken to reduce the negative air quality impacts that can be associated with growth and development. A condensed version of the policy paper, with less specific recommendations, has been prepared as a background report for the Durable Halton process. There will be a staff presentation on this issue at the Health and Social Services Committee meeting.

Air Quality Health Impacts

Poor air quality poses a significant public health risk to people living in southern Ontario. The five common air pollutants, ground-level ozone, fine particulate matter, sulphur dioxide, nitrogen dioxide and carbon monoxide, have been clearly and consistently linked to acute health impacts such as increases in non-traumatic deaths, hospital admissions for heart and lung conditions, emergency room visits, asthma symptoms and respiratory infections at concentrations that are commonly experienced in southern Ontario. A growing body of scientific literature indicates that these common air pollutants also contribute to the development of chronic heart and lung diseases including lung cancer and asthma.

A study conducted jointly by Health Canada and Environment Canada determined that the five common air pollutants contribute to about 2,900 deaths each year in four Ontario cities – Windsor, Hamilton, Toronto and Ottawa. About one third of these deaths were attributed to short-term exposures to higher levels of the five air pollutants, while about two thirds were attributed to long-term exposures to lower levels of fine particulate matter alone. The researchers determined that the five air pollutants are responsible for between 7 and 10% of all non-traumatic deaths occurring in these four Ontario cities. Given Halton's location between Toronto and Hamilton, it is expected that these numbers reflect the situation in Halton as well.

While everyone can be negatively affected by poor air quality, the research demonstrates that newborns, children, the elderly, and people with pre-existing health conditions such as heart disease, asthma and diabetes are particularly sensitive to the adverse effects of air pollution.

Sources of Air Pollution

There are five major sources of air pollution in Ontario: transboundary air pollution that is emitted in the United States; on-road vehicles and off-road equipment in the transportation sector; fuel consumed for space and water heating in buildings and for the generation of electricity; industrial sources; and open sources such as road dust, quarries and general solvent use.

While transboundary air pollution has a substantial impact on air quality in Halton Region, local and regional sources of air pollution that are within the influence of Halton residents and/or their local and regional governments also have a significant impact. These local and regional sources include on-road vehicles, off-road equipment, furnaces, boilers, electricity generating stations, industrial and commercial operations, quarries and road dust.

Vehicle-Related Air Pollution

Emission inventories indicate that the transportation sector is one of the most important sources of air pollutants and greenhouse gases within Halton Region, Ontario and Canada. In addition, a large number of traffic corridor studies have demonstrated that health impacts such as hospitalizations for asthma, deaths from strokes, hospitalizations and deaths from respiratory disease are significantly higher among children, adults, and the elderly who live in close proximity to roads with high traffic density than among those who live further away. These studies identify the need to significantly reduce vehicle-related air pollution in our communities.

A great deal of progress has been made to reduce emissions from individual vehicles, however this progress has been offset to a large extent by the increasing number of vehicles on the road and the increasing number of kilometres travelled by Canadians; a pattern that is particularly true in the Greater Toronto Area.

Regional and local governments can help to reduce the number of vehicles on the road by encouraging the development of “complete” communities that can be efficiently serviced by public transit and alternative modes of transportation, providing efficient transit service within and between communities, and developing the infrastructure needed to support walking and cycling as modes of transportation within our communities.

A few studies have demonstrated that planning decisions can have a significant impact on vehicle-related emissions. For example, the California Air Resources Board (CARB) found that “complete” neighbourhoods (i.e. compact neighbourhoods built around public transit with a variety of services within a five minute walk) can reduce vehicle-related air emissions by up to 20% relative to traditional neighbourhoods (i.e. sprawled neighbourhoods that are separated from public transit, commercial services and recreational facilities).

A few studies have also demonstrated that reductions in traffic can produce measurable improvements in air quality and human health. For example, researchers found that the alternative transportation strategy used in the City of Atlanta during the Olympics, which shifted people from cars to public transit, reduced traffic counts by 22.5%, peak ozone levels by almost 28%, and

asthma-related hospital admissions among children by 11 to 44% relative to the weeks leading up to the Olympics.

Building-Related Air Pollution

Emission inventories indicate that fuel consumed for space and water heating in buildings and for the generation of electricity is also a significant source of air pollution in Halton and Ontario. The five coal-fired power plants that provide about one quarter of Ontario's electricity are responsible for about 23% of the sulphur dioxide, 14% of the nitrogen oxides, and 20% of the greenhouse gases emitted within Ontario. The largest of these five plants, the Nanticoke Generating Station, is upwind of Halton Region. In addition, fuel consumed in furnaces, boilers and fireplaces within Halton Region can have a substantial impact on local air quality because the emission sources are distributed throughout the community and emit pollutants relatively close to ground level. These fuel and electricity-related emissions are heavily influenced by the size, design and situation of buildings in our communities.

Small residential buildings built to high energy efficiency standards such as the EnerGuide 80 standard, can use up to 35% less energy (i.e., natural gas and electricity) than buildings built to current day standards. In addition, buildings built to high energy and environmental standards such as the LEEDTM Silver, Gold or Platinum standards can reduce energy use in buildings by 35 to 45% relative to similar buildings built to Code. These energy reductions translate into reductions in air pollution and greenhouse gases from the buildings and from electricity generating stations while providing long-term cost savings for residents and/or owners of the buildings.

Building-related air pollution can also be reduced by encouraging the use of alternative energy systems such as co-generation in the commercial, industrial and institutional sector, and renewable energies in the community (e.g. wind generated electricity). Co-generation, which involves the production of both electricity and heat (which can be used to heat or cool air and water in buildings) has the potential to halve the air pollution and greenhouse gases that can be associated with the generation of electricity and the heating or cooling of buildings when done separately. Renewable energies such as wind, geothermal and deep lake cooling have the potential to produce electricity or to displace the need for electricity or natural gas, while generating almost no air pollution or greenhouse gases.

With changes in energy policies at a provincial level and increases in the price of natural gas and electricity, there are many opportunities to reduce fuel consumption associated with growth and development in the Region over the next 25 years. While there are limits on the legislative authority of the regional and local governments in this regard, there may be creative ways to accelerate the shift towards greater energy efficiency and alternative energies through the land use planning process. In Vancouver, for example, proponents are pressed to achieve higher environmental standards when applying for rezoning or Official Plan Amendments. In addition, in Chicago and Vancouver, discretionary zoning has been used to secure environmental benefits such as "green roofs" in exchange for an increase in density above a certain threshold.

Air Pollution – Industrial, Commercial and Open Sources

Industrial and open sources are also important contributors of air pollution in Ontario and within the Region. While regional and local governments do not have the legislative authority to establish air quality criteria or emissions standards that are applied to pollution sources such as factories, refineries, quarries or truck depots, they have some ability to prevent or reduce the adverse health effects that may be associated with incompatible land uses through the land use planning process. Zoning and set-backs can be used to separate sensitive land uses such as residential neighbourhoods from activities associated with air pollution. Performance and/or design measures can also be requested to prevent or mitigate the adverse effects that may be associated with the development of new facilities or operations. The local municipalities do use zoning to separate incompatible land uses and do review industrial and commercial facilities carefully before issuing building permits. The Region is involved in these review processes and also comments on applications for certificates of approval when there is the potential for substantial impacts on health or the environment.

Provincial and Regional Objectives

The Ontario Government's new Provincial Policy Statement and the newly revised Regional Official Plan (August 2006) clearly identify the protection of public health and the improvement of air quality as priorities to be addressed through the land use planning process. The two documents also identify objectives and policies for "complete communities", the transportation sector, energy systems, and incompatible land uses, that would, if implemented, mitigate the negative air quality and human health impacts that could be associated with growth in Halton Region. The next stage in the process is to develop the air quality assessment tools and policy instruments that would support the implementation of these objectives.

Assessing Air Quality

In the air quality field, there are a number of different tools that can be used to assess air quality and inform policy development; emission inventories, air monitoring, air quality modelling, and air pollution health impact modelling.

Emissions inventories produced by the provincial and federal governments provide estimates of the volume of air pollutants that are emitted from different sources on an annual basis. While these inventories do indicate something about the overall contribution of emission sources to regional air quality, they do not indicate how those emission sources impact on local and regional air quality because they do not indicate how air pollutants are dispersed once they are released into the air. The dispersion of air pollutants is affected by a number of factors including the location of their release, the height at which they are released, the meteorology that exists when they are released (e.g., wind direction and wind speed), and the topography of the location in which they are released (e.g., flat land or a valley).

Stationary and portable air monitoring instruments measure the actual concentration of various air pollutants in the air. Stationary air monitors, such as those operated by the Ontario Ministry of the Environment, can provide continuous readings of air pollutants in a particular location. They can

be used to identify peaks in air pollution and to follow trends in air quality over time. Portable air monitors can be used to measure air pollution at different points across the community. They can provide valuable information about how air quality varies from one neighbourhood to another. They can also be used to monitor air quality in micro-environments such as traffic corridors. These instruments cannot however, identify the sources that contribute to the concentrations measured. Nor can they predict how concentrations might be affected by new facilities, new developments, or new policies (e.g., new regulations for vehicles).

Air quality modelling, conducted with sophisticated computer models, can fill the gap left by air monitoring instruments and emission inventories. Using meteorological information, location, topography, and emissions data that includes the height, speed and frequency of emission releases, air quality modelling tools can estimate the concentration of different air pollutants across the community. Because these tools can examine emission sources separately, they can also assess the contribution of different emission sources to concentrations of air pollutants in different parts of the community. In addition, air quality modelling tools can be used to forecast how concentrations of air pollutants might be impacted by new emission sources or by changes in policy. In this way, they can be used to inform land use planning decisions and policy development.

Air quality experts at Health Canada and Environment Canada have developed the Air Quality Benefits Assessment Tool (AQBAT) to estimate the human health impacts associated with different concentrations of air pollutants. Using monitored or modelled concentrations of air pollutants, AQBAT can be used to estimate the health impacts associated with air quality in a community using population statistics for the community, health statistics for the community, and risk coefficients that describe the relationship between specific air pollutants and specific health outcomes. AQBAT can only be used at a community-wide basis; it has not been designed to estimate health impacts for neighbourhoods or subdivisions. It could be used to provide an estimate of the health impacts that would be associated with major changes in emissions experienced in a fairly large community.

Recommendations

It is recommended that the Region establish a community-wide air quality modelling program that can be used to assess air quality across the Region, evaluate the contribution of new emission sources on air quality, and inform land use planning decisions, policy development and health promotion. It should also examine the portable air monitoring equipment and/or resources that could be used to assess air quality in micro-environments and/or to validate air quality modelling results.

In addition, it is recommended that the Region, in collaboration with the local municipalities, explore the policy instruments that might be used to support the development of “complete communities” that encourage the use of alternative modes of transportation and encourage the early application of the EnerGuide 80 standard to small residential buildings, the application of LEEDTM standards to large buildings, and the use of alternative or renewable energy systems in new buildings to improve air quality and retard climate change.

It is also recommended that the Region develop and implement a health promotion program that educates the public about the link between air quality, human health, climate change, and the built

environment, and about the actions that can be taken by individuals, organizations and governmental agencies to improve air quality and/or retard climate change.

Existing Regional Initiatives that Support Improved Air Quality

This report builds on a large number of existing corporate and community initiatives that are expected, in a direct or indirect way, to have a beneficial impact on air quality and climate change. For example, the Region:

- Participates in the *Smart Commute Initiative* that strives to reduce vehicle use among Regional employees by promoting carpooling (PPW125-06);
- Is applying the *Energy and Environment Management System (EEMS)* to its energy efficiency program to evaluate the air quality and greenhouse gas benefits associated with improvements in the corporation's energy efficiency;
- Is developing alternative energy systems around biogas at its wastewater treatment plant and around methane from its landfill site;
- Facilitates the *Halton Partners for Clean Air* initiative which includes representatives for the Region, the local municipalities, community groups, and business organizations (MO-09-04; MO-20-06);
- Facilitated the creation of the *Clean Air Plan* for Halton which identifies actions that organizations and individuals can take to reduce air emissions associated with their own activities (www.halton.ca/hpca; MO-20-06);
- Participates in public awareness campaigns such as the anti-idling campaign, research projects such as the GTA Air Quality Modelling project, and events such as the annual Smog Summit, as an active member in the GTA Clean Air Council (MO-65-04; MO-20-06);
- Has become a member of the *Partners for Climate Protection* initiative (MO-11-05);
- Actively promotes alternative forms of transportation through the *Walk On* health promotion program;
- Has developed the *Regional Transportation Master Plan*, which includes a *Transportation Demand Management Program*, a *Cycling and Pedestrian Infrastructure Plan*, a *Transit and High Occupancy Vehicle (HOV) Strategy*, and an *Air Quality Management Strategy* (Regional Transportation Master Plan: Strategies, Plans and Guidelines, June 2004. Appendices H, I, J and L);
- Reviews and comments on development applications, subdivision plans, and applications for certificates of approval from the Ontario Ministry of the Environment for industrial and commercial operations in an effort to mitigate negative air quality impacts; and
- Developed a *Comprehensive Housing Strategy for Halton* which should have a positive impact on air quality by encouraging the development of apartments, townhouses and smaller houses use less energy and therefore produce less air pollution and fewer greenhouse gases than larger, detached houses.

Conclusions

Poor outdoor air quality poses a significant risk to public health in Halton Region and in many other communities in southern Ontario. Transportation systems, fuel consumption for space and water heating and electricity generation, and industrial and open sources all represent major sources of air pollution in Ontario and Halton Region. Emissions of air pollutants and greenhouse gases from the transportation sector can be significantly reduced in “complete communities” that are conducive to alternative modes of transportation, while emissions from buildings and electricity generation can be significantly reduced when buildings are constructed to high energy efficiency standards and designed around alternative and renewable energy systems.

With the growth expected in Halton Region over the next 25 years (i.e. about 375,000 residents from 2001 to about 780,000 in 2031), there will be increasing stresses on the local airshed as new vehicles, homes and workplaces are introduced to the community. The Region should develop a community-wide air quality modelling program that can be used to assess air quality and support land use planning decisions, policy development, and health promotion. It should also examine the portable air monitoring equipment and/or resources that may be needed to assess air quality in micro-environments and to validate air modelling.

Working in collaboration with the local municipalities, the Region should explore the policy instruments that could be used to support the development of “complete communities”, alternative modes of transportation, energy efficiency, and alternative energies in the Region. The Region should also develop a health promotion campaign to increase public awareness about the link between air quality, human health, climate change, and the built environment, and the actions needed to improve air quality and/or retard climate change.

FINANCIAL/PROGRAM IMPLICATIONS

It is proposed that \$50,000 in the 2007 budget reserves be allocated to initiate a community-wide air quality modelling program. This money would be used by the Health Department to contract services to build a Halton-specific air quality model that can be used to assess air quality across the Region under existing conditions. With Council support, a detailed report on long-term costs for air quality modelling will be prepared prior to the 2008 budget. There may be staff resource implications associated with these recommendations as well which would be addressed in the detailed report prior to the 2008 budget process.

