



Corporate Air Quality Strategy

Corporate Clean Air Task Force
The Regional Municipality of York

April 2008


York Region



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Executive Summary

York Region's Commitment to Address Air Quality and Climate Change

York Region is committed to addressing air pollution and climate change by pursuing initiatives that will reduce emissions of smog precursors (or criteria air contaminants) and greenhouse gases. Many of the activities that release smog precursors and greenhouse gases are the same – the combustion of fossil fuels for energy, electricity and transportation. Taking action to reduce these emissions can simultaneously improve air quality locally and address global climate change.

The Regional Municipality of York's Corporate Clean Air Strategy addresses the mandate of the Region's Corporate Clean Air Task Force: "To identify, develop and recommend department-specific corporate clean air actions and to incorporate these recommended actions/action plans into a comprehensive Air Quality Strategy."

Activities of the Corporate Clean Air Task Force

The Corporate Clean Air Task Force has compiled an inventory of ongoing and proposed initiatives to improve air quality; it has established a corporate emissions baseline; reviewed best practices from other jurisdictions; and met with external stakeholders to solicit feedback on potential clean air initiatives and on the framework for a Corporate Air Quality Strategy. The next step is to act on the recommendations in the Strategy and to develop and implement department-specific actions.

Scope and Principles for the Corporate Air Quality Strategy

The Strategy addresses all Regional activities and operations that contribute to emissions of greenhouse gases and criteria air contaminants. The Strategy describes key goals and provides a framework to accomplish these goals. Included is a list of principles that will help to ensure that clean air actions are implemented, monitored and measured.

Climate Change, Air Quality and Human Health

The growing body of scientific evidence supports the link between climate change, air quality and human health. The health effects resulting from poor air quality are extensive, but primarily affect the body's respiratory and cardiovascular systems. Studies have consistently linked common air pollutants with conditions such as asthma, lung and ovarian cancer, heart attack, stroke and respiratory illnesses such as bronchitis. There is growing evidence of health risks due to climate change, including temperature-related morbidity and mortality, vector-borne diseases, effects of water and food contamination, air pollution health effects, extreme weather events and social and economic changes.

Sources of Corporate Emissions

Based on the Regional Energy and Environmental Management (EEMS) System inventory, York Region generated approximately 55,000 tonnes of greenhouse gases and 388 tonnes of criteria air contaminants in 2004. Fleets contributed to about half the corporate emissions, while water and wastewater facilities were the second greatest contributor at 25 per cent, followed by buildings at 20 per cent and street and traffic lighting at three per cent. Cost of energy usage was over \$18 million.

Action on Emissions

York Region is taking action to reduce emissions in Regional activities and operations, both directly through energy conservation (e.g. building retrofits) and through Regional strategies that influence emission reductions (e.g. promoting and supporting public transit). Clean Air Action Plans will be developed for each initiative, or set of initiatives, which will include targets to track and measure success. Evaluations will demonstrate the success of each initiative through measuring and reporting of emission reductions or other appropriate indicators.

Conclusions and Recommendations

The Corporate Air Quality Strategy provides a set of basic principles, evaluation criteria and potential implementation opportunities to support and address challenges relating to the integration of clean air actions into daily operations and long-term planning at York Region. The Strategy also addresses the challenges of meeting the Task Force's mandate to reduce emissions in a growing municipality.

The Strategy supports many other Regional initiatives. While reducing emissions, it will contribute to a sustainability model for municipal decision making about growth management and municipal responsibilities that better integrate the economy, environment and community.

Adoption and implementation of the Strategy will help ensure that the goals set out in the terms of reference for the Corporate Clean Air Task Force are met. Those goals include improvements in air quality, reductions in criteria air contaminants and greenhouse gases, and leadership in environmental initiatives related to emissions.

The Strategy recommendations include establishing a Clean Air Committee, coordinated through the Office of the CAO, to ensure that the implementation and reporting on clean air measures is a priority for York Region. The recommendations for implementation also include Tools to Track, Measure and Monitor, Tools to Finance Clean Air Initiatives, and Department-Specific Clean Air Action Plans.



Introduction

1.1 The Need for a Corporate Air Quality Strategy

The Regional Municipality of York has a history of environmental responsibility as demonstrated through long-range plans such as Vision 2026, the Regional Official Plan, and the evolving Sustainability Strategy. Many other Regional initiatives have led to reductions of emissions of smog precursors and greenhouse gases.

York Region recognized that a coordinated effort was necessary to not only highlight the successes of Regional clean air measures, but also to continue its role as a leader in clean air initiatives. It was also recognized that reducing emissions through specific corporate actions, including changing attitudes and behaviours, will benefit our health, our environment, and our economic and social structures.

Emissions contribute to both local air pollution and global climate change and are influenced by many factors, both localized and long range. Emissions that are related to human activity – combustion of fossil fuels for our energy and electricity use and our transportation needs – can be controlled through coordinated action at all levels of government, within our industrial and business sectors and at the community and individual level.

1.2 Formation of the Corporate Clean Air Task Force

The formation of a Corporate Clean Air Task Force in 2003 demonstrates the Region's commitment to address air quality and climate change. The Task Force's mission is to minimize the potential harm to human health and the environment through activities targeted to reduce emissions of harmful pollutants and greenhouse gases and to ensure that improvements in air quality is a priority for the Region.

The Task Force activities, to date, have included compiling an inventory of ongoing and proposed initiatives to improve air quality, establishing a corporate emissions baseline, reviewing best practices from other jurisdictions, and meeting with external stakeholders to solicit feedback on the Strategy and clean air initiatives. The second phase of the project is to act on the recommendations in this report including the development and implementation of department specific actions.

This report on a Corporate Air Quality Strategy has been prepared to address the mandate of the Task Force: "To identify, develop and recommend department-specific Corporate Clean Air Actions and to incorporate these recommended actions/action plans into a comprehensive Air Quality Strategy." This mandate also addresses the Region's commitment as a member of Partners for Climate Protection Program, a joint program of the Federation of Canadian Municipalities and the International Council for Local Environmental Initiatives, to develop a local action plan to reduce greenhouse gases that contribute to climate change.

1.3 Clarifying Corporate Versus Community Emissions

Municipalities control and/or influence both corporate emissions (infrastructure and fleets) and community emissions (energy to heat homes, personal vehicle use). Through programs such as the Partners for Climate Protection, municipalities report on emission reduction efforts from both corporate and community sources. To avoid duplication, community emissions are reported by the lower (or single) tier municipality, and corporate emissions are addressed by all municipalities. Through the Corporate Clean Air Strategy, the Region will address corporate emissions – both greenhouse gases to meet the Partners for Climate Protection commitment and criteria air contaminants that impact on local air quality.



2

Scope and Principles for the Corporate Air Quality Strategy

The Corporate Air Quality Strategy provides a set of basic principles, evaluation criteria and potential implementation opportunities that will support the integration of clean air actions into day-to-day operations and long-term planning at the Region. The Strategy will be supported by action plans, both existing and proposed, and tools to measure and monitor success. Additional supporting material (e.g. evidence linking air quality to health; federal/provincial incentives) has been developed to assist in the creation of Clean Air Plans.

2.1 Scope of the Strategy – Greenhouse Gases and Criteria Air Contaminants

The Corporate Air Quality Strategy focuses on improving air quality by addressing Regional activities that contribute to emissions. These emissions include greenhouse gases – carbon dioxide, methane, nitrous oxide and smog precursors, or criteria air contaminants – nitrogen oxides, sulphur oxides, particulate matter, volatile organic compounds and carbon monoxide. While community emissions are recognized as a significant source of emissions within a municipality, this Strategy focuses on corporate emissions from Regional sources.

The delivery of the Region's critical government functions results in emissions of smog forming and greenhouse gas-producing air pollutants. The Region is responsible for several essential municipal services and delivers these services from a number of administrative and operational sites. The Region also enters into contracted agreements for service delivery (e.g. transit, road paving, transportation of solid waste, and grounds maintenance).

2.2 Strategy Principles

The Strategy principles describe key goals of the Strategy and provide a framework to accomplish the goals. Adherence to these principles will ensure that clean air actions are implemented, monitored and measured in order to continuously improve air quality and reduce greenhouse gas emissions.

Principle 1:
Ensuring that Air Quality and Climate Change are Corporate Priorities

To continually improve air quality, address climate change and ensure that clean air initiatives remain current:

- All Regional activities and operations, existing or proposed, will take into consideration emissions and emission reduction potential.
- Clean Air Action Plans will be reviewed and updated on a regular basis.
- Best practices and new technologies will be assessed.

Principle 2:
Building On and Supporting Ongoing Regional Initiatives

The Corporate Air Quality Strategy is consistent with several existing Regional initiatives including:

- **The Regional Official Plan** aims to conserve and improve the natural environment. It promotes compact urban form which leads to decreased emissions from decreased vehicle fuel consumption.

Supportive Action: The Corporate Air Quality Strategy outlines action plans to improve air quality through reduced energy and fuel consumption.

- **The Transportation Master Plan** guides transit and other transportation issues in the immediate and long-term future.

Supportive Action: The Corporate Air Quality Strategy advocates use of public transit and alternative modes of transportation.

- **The Greening Strategy** provides a framework for all Regional environmental initiatives, addressing activities that have impacts on land, air and water.

Supportive Action: The Corporate Air Quality Strategy supports air related initiatives.

- **State of the Environment** reporting is an exercise in collecting, monitoring and measuring progress of environmental initiatives.

Supportive Action: The Corporate Air Quality Strategy provides tools and evaluation criteria for identifying new clean air measures and mechanisms to measure progress.

- **The Sustainability Strategy** provides a leadership framework for implementing and monitoring all Regional sustainability efforts.

Supportive Action: The Corporate Air Quality Strategy applies to all Regional activities and operations, addressing sustainability efforts relating to emissions reductions.

Principle 3:
Identifying New Clean Air Initiatives

Specific evaluation criteria will be utilized to review and select new clean air initiatives and to build on the initiatives already underway. To demonstrate that an initiative is a clean air measure, the following triple bottom line impacts – environment, economy and community – shall be considered:

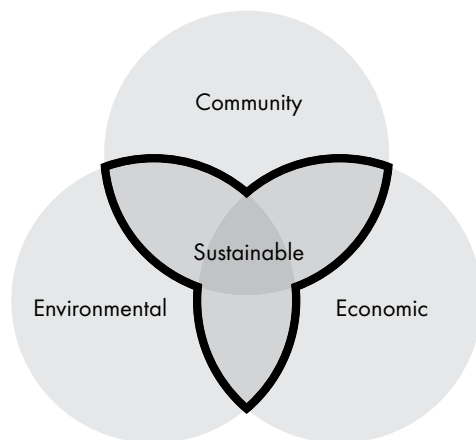


Table 1 – Examples of Triple Bottom Line Benefits of Emission Reductions

BENEFIT	EXAMPLE
Environmental benefits	<ul style="list-style-type: none"> Greenhouse gas and criteria air contaminants emissions reduction through decreased energy consumption Co-benefit of reducing impact on our natural resources – land, water and air
Economic benefits	<ul style="list-style-type: none"> Cost savings by reducing energy consumption Funding opportunities through grants, incentives and partnerships Promotion of local business markets for innovative clean air technologies and processes
Community benefits	<ul style="list-style-type: none"> Improved health of residents in York Region Increased awareness of air quality impacts Partnerships with other local organizations Demonstration of leadership

**Principle 4:
Collaborating with Regional Stakeholders**

Regional stakeholders and residents will continue to be consulted as part of developing and implementing the clean air initiatives that will be part of the Strategy. The Task Force met with External Stakeholders in 2005 and 2006 to solicit input and feedback on clean air initiatives and a framework for a Corporate Air Quality Strategy.

In addition to partnerships and funding opportunities, the potential for Regional participation in emission trading (an economic tool that allows businesses to work together to reduce emissions at lower costs) will be explored in consultation with provincial and federal government agencies.

**Principle 5:
Measuring and Reporting Our Success**

York Region will monitor, evaluate and report annually on the state of emissions and progress towards goals and targets. The following tools will be used:

- The Region's Energy and Environmental Management System (EEMS) software, to assist in creating greenhouse gases and criteria air contaminants emissions inventories.
- Clean Air Action Plans to identify targets, or measures of success.
- Annual reports indicating status of measures identified in previous action plans.



3

Climate Change, Air Quality and Human Health – A Call for Action

Climate change mitigation refers to actions to reduce emissions of greenhouse gases. Climate change adaptation means making adjustments that reduce the adverse impacts of climate change and preparing for its unavoidable consequences. Examples of climate change adaptation include assessing and addressing vulnerabilities in municipal infrastructure, and preparing for extreme weather events. Public health adaptation includes measures that offset or reduce the effects of climate change on human health and well being.

The growing body of scientific evidence supports the link between climate change, air quality and human health. The major substances that affect local air quality are the criteria air contaminants, or smog-forming pollutants. The increasing concentrations of greenhouse gases in the atmosphere, are contributing to climate change. Many of the activities that release criteria air contaminants and greenhouse gases are the same – the combustion of fossil fuels for energy, electricity and transportation. Taking action to reduce these emissions can simultaneously improve air quality locally and address global climate change.

3.1 Effects of Climate Change

As greenhouse gas emissions continue to rise, it is anticipated that climate change will contribute to more frequent and intense precipitation, more extreme weather events, damage to infrastructure (energy supply, transportation, water supply, wastewater) and natural systems, greater financial burden due to increasing costs of emergency and social services, repairs to infrastructure and loss of economic productivity.

There is growing evidence of health risks due to climate change including temperature-related morbidity and mortality, vector-borne diseases, effects of water and food

contamination, air pollution health effects, extreme weather events and social and economic changes. These health risks have significant public health implications to food security and nutrition, water quality, air quality, disease monitoring and surveillance, emergency response, housing and shelter, and other social services.

To ensure capacity to manage health and other infrastructure risks associated with climate change, municipalities will play a vital role in implementing mitigation and adaptation strategies. These include greenhouse gas emission reduction measures, adaptation and response planning, policy development and public outreach and engagement.

3.2 Health Effects of Poor Air Quality

The health effects resulting from poor air quality are extensive, but primarily affect the body's respiratory and cardiovascular systems. Studies have also consistently linked common air pollutants with conditions such as asthma, lung and ovarian cancer, heart attack, stroke and respiratory illnesses such as bronchitis. A growing body of evidence from Canada, the U.S. and Europe have documented increased rates of heart attack and more hospitalizations for serious heart diseases such as heart failure and stroke after both short and long-term exposure to polluted air.

People with chronic diseases (e.g. chronic obstructive pulmonary disease), children, along with those who work/exercise outdoors are particularly vulnerable to poor air quality. Recent research has shown that children with long-term exposure to air pollution have exhibited delayed lung development. Furthermore, particulate matter has been shown to contribute to cardiovascular illness, hospitalization and mortality. The elderly, those with underlying heart or lung disease, lower socioeconomic populations, and diabetics may be at increased riskⁱⁱⁱ.

3.3 Health Effects of Urban Sprawl and the Built Environment

Urban sprawl and the reliance on vehicular transportation has been increasingly linked to adverse health effects due to physical inactivity and adverse air quality⁵. According to Frank et al (2004), residents who lived in sprawling developments spent more time in the car. The same study indicated for every hour spent driving in a car, the likelihood of being obese increased by six per cent.

According to Ewing et al (2003), people whose homes are in high sprawl areas and are far from work and retail stores and who rely more on cars, weigh more than people who live in compact cities. Furthermore, according to Ontario's Chief Medical Officer of Health Report in 2004, *Healthy Weights, Healthy Lives*, most of the municipalities in Ontario with lower rates of obesity have large urban centres pointing to a reduction in car use and an increase in physical activity. The report provided several recommendations to the Government of Ontario in order to create a provincial environment that promotes healthy weights including "supporting public transportation and infrastructure to encourage safe, active transportation options."

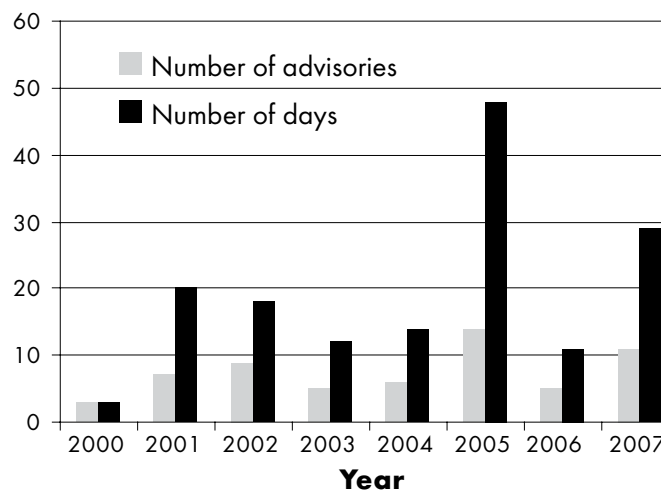
Similarly, in 2008, the Heart and Stroke Foundation *Report Card on Canadians' Health*, recommended working with developers to create neighbourhoods and communities that promote walking, cycling, and decrease auto dependency. It noted that rolling out a national Air Quality Health Index in all parts of the country and strengthening federal and provincial legislation governing air quality would increase healthy lifestyles and healthy communities.

3.4 Air Pollutants in Our Environment – Levels and Exposures

While levels of certain criteria air contaminants (nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and carbon monoxide (CO)) in Ontario are typically below the air quality criteria established by the Ministry of the Environment, these contaminants are still of concern as existing standards do not reflect current health literature. Environment Canada estimates that at least 30 per cent of Canadians are being exposed to higher than acceptable levels of fine particulates. Ozone and particulate matter frequently exceed health-based reference levels established in 1999 by a Federal Provincial working group. Between 2001 and 2005, there has been no significant decrease in fine particulate pollution in Canada.

The number of Smog Advisories issued by the Ministry of Environment for the York Durham area has fluctuated over the last several years as indicated in Table 2:

Table 2 – Smog Advisories for the York-Durham Region by year



Did you know?

In 2005, Toronto Public Health in collaboration with Environment Canada completed a study on the combined effects of air pollution and hot weather on health. They estimate that by 2080, heat related deaths will triple and air pollution related deaths will increase by 25 per cent.

3.5 Burden of Illness from Air Pollution

The Ontario Medical Association has developed a model for calculating the burden of illness from air pollution called the Illness Cost of Air Pollution. The model estimates the health effects and economic costs of smog-related air pollution in Ontario and for health unit districts across the province and includes premature deaths, cardiovascular and respiratory hospital admissions, emergency department visits, and millions of minor illness days in Ontario. Table 3 provides the model findings for York Region while Table 4 provides the findings for the Province of Ontario. All figures used in Tables 3 and 4 are based on the Ontario Medical Association's report, *The Illness Cost of Air Pollution*.

3.6 Combined Effects of Climate Change and Air Quality

While air quality and climate change have serious and separate impacts, their combined effects lead to more serious health impacts. Hotter temperatures provide conditions conducive to the formation of smog. Higher summer temperatures increase the demand for electricity to provide air conditioning. Increased electrical power generation using fossil fuels increases the amount of air pollution in the atmosphere thus perpetuating an unhealthy cycle. It is important to reduce both smog-forming pollutant emissions and greenhouse gas emissions.

Table 3

Summary of Health Impacts
& Illness Costs of Air Pollution
– **Region of York**

Health Impact Associated with Air Pollution	2006	2007
Premature Mortality	300 deaths	300 deaths
Hospital Admissions	1,010 admissions	1,020 admissions
Emergency Dept. Visits	3,500 visits	3,550 visits
Minor Illness Symptom Days	1.86 Million	1.87 Million
Health Care Costs	\$30.64 Million	\$30.86 Million
Lost Productivity Due to Illness	\$24.76 Million	\$24.96 Million

Table 4

Summary of Health Impacts
& Illness Costs of Air Pollution
– **Province of Ontario**

Health Impact Associated with Air Pollution	2006	2007
Premature Mortality	5,940	6,050
Hospital Admissions	17,070	17,340
Emergency Dept. Visits	60,640	61,610
Minor Illness Symptom Days	29.46 Million	29.66 Million
Health Care Costs	\$511.02 Million	\$515.89 Million
Lost Productivity Due to Illness	\$377.36 Million	\$380.8 Million



4

Sources of Emissions

4.1 National and Provincial Profiles

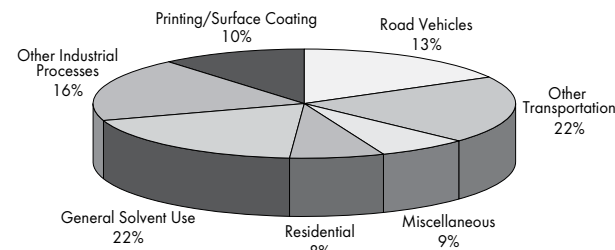
Across Canada in 2004, the production and consumption of energy accounted for 82 per cent of greenhouse gas emissions (transportation, electricity generation, space heating, fossil fuel production, mining and manufacturing). From 1990 to 2004, emissions from these sources rose 30 per cent. The increase in emissions from transportation was a result of the increase in number of vehicle-kilometres travelled and the shift from automobiles to sport utility vehicles and small pickup trucks. These heavier vehicles emit on average 40 per cent more greenhouse gases per kilometre than automobiles.

The increase in emissions from power generation was driven by a rising demand and by the increase in the use of fossil fuels for electricity generation relative to other non-emitting sources, such as nuclear and hydro. Factors that influenced growth in demand for electricity at the residential level included population growth, increased numbers of electrical appliances in use and a slight increase in the average home size.

While as much as half of Ontario's air pollution is caused from sources within the United States, much of Quebec's emissions come from Ontario sources. The electricity sector accounts for 15 per cent of Ontario's nitrous oxide (NO_x) emissions and 25 per cent of sulfur dioxide (SO₂). Transportation accounts for 65 per cent of nitrous oxide (NO_x), 35 per cent of volatile organic compounds (VOCs) and 20 per cent of fine particulate matter (PM_{2.5}) emissions in Ontario.

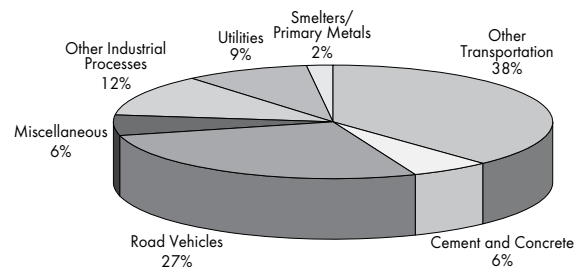
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Ontario Volatile Organic Compounds (VOCs) Emissions by Sector (Emissions from Point/Area/Transportation Sources, 2005 Estimates)



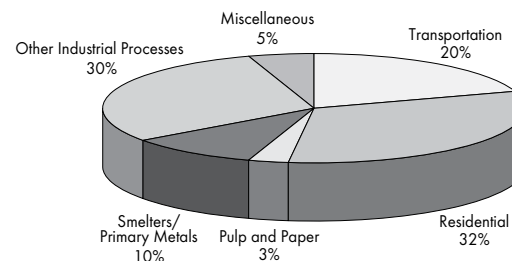
Note: 2005 is the latest complete inventory. Emissions may be revised with updated source/sector information or emission estimation methodologies as they become available.

Ontario Nitrogen Oxides (NO_x) Emissions by Sector (Emissions from Point/Area/Transportation Sources, 2005 Estimates)



Note: 2005 is the latest complete inventory. Emissions may be revised with updated source/sector information or emission estimation methodologies as they become available.

Ontario Fine Particulate Matter (PM_{2.5}) Emissions by Sector (Emissions from Point/Area/Transportation Sources, 2005 Estimates)



Note: 2005 is the latest complete inventory. Emissions may be revised with updated source/sector information or emission estimation methodologies as they become available.

4.2 Regional (Corporate) Sources of Emissions

Trends in greenhouse gas and criteria air contaminants emissions at a Regional level are consistent with the Canadian and provincial profiles. Major Regional sources of emissions are buildings, street and traffic lighting, water and wastewater facilities and regional fleets.

Emissions are indirectly generated through electricity consumption. The Region directly contributes to air pollution through combustion of natural gas, gasoline and diesel in Regionally-owned and operated vehicles (public transit, Emergency Medical Services (EMS) and York Regional Police vehicles and equipment.

4.3 Corporate Emissions Inventory

A corporate inventory is one tool that assists in measurement and verification of measurable emissions and emissions reductions strategies. The intent of an emissions inventory is to provide insight into the Region's major emitters and to provide a means to quantify the impact of clean air solutions.

Energy and cost data have been collected from the Energy and Environmental Management System (EEMS) and different Regional departments, and used to estimate emissions generated by Regional operations. Emissions are estimated using emission factors. An emission factor is defined as the amount of pollutant released per unit of activity. Emission factor sources include Canada's Greenhouse Gas Inventory and Ontario Power Generation.

In 2004, the Region began tracking electricity and natural gas data from buildings, water and wastewater facilities, and street and traffic lighting on the Energy and Environmental Management System. Fleets' fuel and kilometres travelled data were collected for the year 2004, on a per-vehicle basis to enable the most accurate generation of an emissions inventory. This information was collected for the purposes of establishing the baseline inventory and is not continuously tracked through the Energy and Environmental Management System (EEMS).

Table 5 summarizes the corporate emissions inventory and includes on-road fleets including: fleets for York Region Transit, Emergency Medical Services (EMS), York Regional Police and Transportation and Environmental Services, and employee personal vehicle use for business; water and wastewater, buildings; and street and traffic lighting. The inventory only includes emissions generated by on-road fleets as insufficient data was available for off-road emissions estimation. The year 2004 has been selected to establish a baseline inventory of emissions of Regional activities and operations.

York Region generated approximately 55,000 tonnes of greenhouse gases and 388 tonnes of criteria air contaminants in 2004.

Fleets contributed to about half the corporate emissions, while water and wastewater facilities were the second greatest contributor at 25 per cent, followed by buildings at 20 per cent and street and traffic lighting at three per cent. Off-road vehicle criteria air contaminants emissions could not be estimated, because there were no standard emission factors available.

Cost of energy usage was over \$18 million.

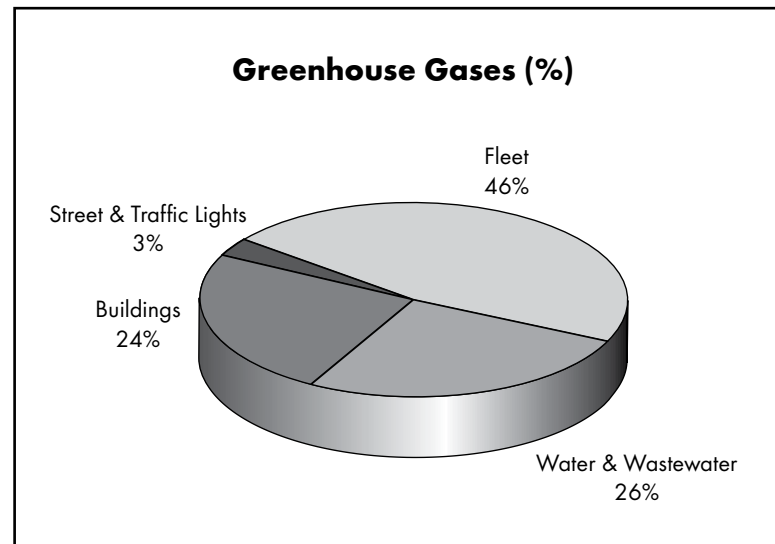
From this inventory, benchmarks can be generated for fleets, facilities and Regional operations. Subsequent emissions inventories can be used as one indicator to measure the success of energy savings measures and clean air initiatives.

Table 5 – 2004 Corporate Emissions Inventory by Regional Sector

	GHGs* [t]	GHGs** [%]	CACs [t]	CACs [%]	Cost [\$]
Fleets	25,574	46	221	57	\$7,915,766
Water & Wastewater	14,626	26	96	25	\$5,411,678
Buildings	13,347	24	60	15	\$4,300,609
Street & Traffic Lights	1,727	3	11	3	\$1,045,784
Total	55,274	100	388	100	\$18,673,838

*Greenhouse Gases (GHGs,)

** Criteria Air Contaminants (CACs)
tonnes (t)





Action on Emissions

5.1 Federal and Provincial Initiatives

Federal and Provincial governments share in the burden of poor air quality and climate change with communities and municipalities. Both levels of government are taking steps toward decreasing emissions through various initiatives including legislation, support for municipal government activities and community partnerships.

Funding opportunities are of particular interest to municipal corporations because they help offset the costs of capital-intensive projects. Examples of federal funding opportunities include the Federation of Municipalities' Green Municipal Funds. These funds support the needs of municipal governments, specifically environmental infrastructure initiatives. The Provincial government offers tax incentives, rebates and credits for Vehicles Powered by Alternative Fuels, for Producers of Clean Power and those who participate in fuel conservation. The province also supports municipal action by acknowledging the link between air quality, climate change, public health and land use planning in the Provincial Policy Statement under Section 3 of the *Planning Act*. For example, the Provincial Policy Statement says that "land use patterns within settlement areas shall be based on densities and a mix of land uses which minimize negative impacts to air quality and climate change and promote energy efficiency."

5.2 Local Collaborative Partnerships

York Region participates in many partnerships at the local or municipal level to collaborate on actions to improve air quality and to share best practices on the development and implementation of clean air action plans. Examples of these collaborations include the Partners for Climate Protection Program and the Greater Toronto Area Clean Air Council.

Partners for Climate Protection

York Region is a member of the Partners for Climate Protection Program, a partnership of over 130 municipalities committed to taking action on climate change. The program is supported by the Federation of Canadian Municipalities and the International Council for Local Environmental Initiatives. Through the Partners for Climate Protection Program, municipalities create greenhouse gas emissions inventories, develop local action plans to reduce emissions, monitor progress towards emission reduction goals and report on results.

In 2002, York Region obtained the energy services of the International Council for Local Environmental Initiatives to assist in the compilation of a 2001 baseline greenhouse gas emissions inventory. The development of the Energy and Environmental Management System (EEMS) prompted the establishment of another baseline (refer to Table 5 illustrating the 2004 greenhouse gas emissions in the corporate emissions inventory table).

Including greenhouse gas emissions in the Corporate Air Quality Strategy and developing Clean Air Actions that identify greenhouse gas emission reductions, will assist the Region in achieving the Five-Milestone process outlined in the Partners for Climate Protection Program.

Greater Toronto Area Clean Air Council

The Greater Toronto Area Clean Air Council is administered by the Clean Air Partnership, a non-profit organization that works in partnership with governments, non-profit groups and industry to improve air quality and reduce emissions of air pollutants. The council is composed of 29 municipalities located within the Greater Toronto Area that are working together to share information and develop clean air tools and processes. Two projects that will aid in the Region's emissions reductions efforts are the Decision Matrix and Air Quality Modelling.

The intent of the matrix is to aid municipalities in assessing and prioritizing what emission reduction measures should be implemented. The outcome of the Air Quality Modelling project will be a set of maps illustrating air quality in various parts of Halton, York, Peel and Waterloo regions and the cities of Toronto and Hamilton. This information can assist municipalities in assessing health risks associated with existing and future land use issues.

5.3 Regional Clean Air Initiatives – Evidence and Best Practices

York Region is taking action to reduce emissions in Regional activities and operations. This includes steps to reduce emissions directly through energy conservation (e.g. building retrofits) and through Regional strategies that influence emission reductions (e.g. promoting and supporting public transit). Evidence to support ongoing clean air initiatives is shown through the successes of our existing initiatives and through best practices from other jurisdictions.

An extensive list of Regional clean air initiatives is included in Appendix A. Clean Air Action Plans will be developed for each initiative or set of initiatives, which will include targets to track and measure success of each initiative.

In addition to the Corporate Emission Inventory, inventories can also be created with other data in order to establish benchmarks and measure success through other performance targets. An example of data that is presently being collected to measure success is demonstrated in Table 6.

Table 6
Sample Inventory of
Measures of Success
in York Region

Initiative	Measure (per year)	Goal (↑/↓)	Baseline	Achievement
York Region Transit	Ridership	↑	8.4 million (2002)	> 18 million (2007)
Water for Tomorrow	Water Savings	↑	0.657 million m3 (2002)	7.4 million m3 (2007)
Administrative Centre Retrofit	Electricity Consumption	↓	7.4 million kWh (2004)	6.4 million kWh (2006)
Traffic and Pedestrian Signal Light Retrofit	Typical Intersection Electricity Consumption	↓	7.59 million kWh (2002)	0.058 million kWh (2007)

Energy Conservation – Electricity and Natural Gas Use

By reducing electricity demand, less fossil fuel is combusted and emissions are reduced. Space and water heating for buildings is fuelled by electricity and natural gas. Therefore, improving the efficiency of building mechanical and water systems reduces the demand for these fuel sources.

Actions:

- Administrative Centre building retrofits have led to a 14 per cent electricity-use reduction.
- Housing York Inc. completed comprehensive studies and retrofits of two facilities in 2007, which are estimated to provide \$45,000 of energy cost savings and a reduction of 50 tonnes of greenhouse gas emissions.
- Water for Tomorrow annually achieves over seven million kilowatt hours in electricity savings, over six million cubic metres of natural gas savings and 14,375 tonnes of carbon dioxide (CO₂) emission reductions.
- Leadership in Energy and Environmental Design (LEED)-Silver is the minimum construction standard for all Regional buildings over 500 square metres, resulting in approximately 25 per cent fewer emissions being generated.
- Retrofitting traffic and pedestrian control signals with energy-efficient light-emitting diodes results in 120 tonnes of greenhouse gas avoidance annually.

Procurement Strategies

Green procurement strategies include purchasing products that are energy efficient or contain recycled material, are readily decommissioned with minimal harmful environmental impacts and have low-embodied energy. Labels such as *Energy Star* and *EcoLogo* help to identify such products. *Energy Star*-rated products consume less electricity than their conventional counterparts. For example, during on-mode, *Energy Star* computer equipment consumes the same amount of power as its conventional counterpart, but when in sleep-mode, they consume less. This can result in a 50 per cent reduction of energy consumption with negligible incremental cost.

Green procurement strategies can also include contracted services that have a reduced impact on the environment, relative to conventional purchases. The profile of green suppliers and contractors has been highlighted through awards such as Pollution Prevention Awards and the Recycling Council of Ontario Awards, demonstrating that environmental impacts from such operations can be mitigated and offered at a competitive price.

Actions:

The Region is developing a Green Procurement Policy to enhance the Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER) Statement of Principle adopted in 2002. The GIPPER Principle gives direction on how to perform environmentally-responsible purchasing by giving consideration to the three R's (reduce, reuse, recycle) and toxic content of materials. Under the procurement policy, if a bid documents requests green products and services, preference may be given to proponents offering this service.

Transportation – Corporate Fleets

Fuel combustion from passenger vehicles, trucks, and construction equipment results in the release of numerous pollutants. Areas where emission reductions can be achieved include: alternative fuels, alternative fuel vehicles, hybrid vehicles, infrastructure to support municipal fleets (e.g. fuelling stations, accelerated retirement of older vehicles, right sizing of vehicles, diesel retrofits and other end-of-pipe technologies as well as driver behaviour and training, fleet and vehicle maintenance, and driving and idling practices).

Action:

- In 2007, York Region Transit successfully completed a trial on the use of B20 and B5 biodiesel on five Viva buses and will be testing diesel-electric buses in 2008.
- York Region Transit currently operates five hybrid sedans and two hybrid pick up trucks.
- The Roads Operations Branch initiated a B5 Biodiesel trial in the summer of 2007 and has a proposed B20 trial scheduled for implementation during the 2008 summer months.
- The Transportation Services Department is currently drafting an anti-idling policy for vehicles and equipment under their control.

Land Use and Transportation Planning

According to Statistics Canada, Canadian cities are characterized by land use patterns that separate home, work, shopping and recreational facilities. Urban sprawl can lead to increased travel distances. Per capita private vehicle fuel usage increased by 10 per cent from 1990 to 2002, and, despite record high fuel prices, Canadians continued to increase their use of gasoline. Between 1996 and 2001, only about 10 per cent of employed Canadians used public transportation to get to work, while 8 per cent cycled or walked.

Increased densities improve opportunities for alternative transportation use. Higher density areas tend to have better sidewalks, bicycle facilities and transit service because increased demand from intensification makes them more cost effective.

Action:

- **VIVA Rapid Transit and York Region Transit (YRT):** Since the amalgamation of transit services in 2001, ridership in York Region has grown by over 10 million riders, or an average of 12 per cent per year. In 2007, YRT carried over 18 million passenger trips, an eight per cent increase over the previous year. By displacing 7,000 individual commuter trips per day, VIVA Phase 1 will avoid more than an estimated 5,000 tonnes of greenhouse gas emissions per year.
- **Smart Commute York Region - Employee Trip Reduction Program:** Under this program, employees are encouraged to use alternative forms of transportation. Alternative work arrangements include compressed work week, flex time and teleconferencing. One survey of commuters found that compressed work weeks can reduce automobile travel by 7 to 10 per cent per day while it is estimated that flextime and telework together can reduce peak-hour vehicle commute trips by 20 to 50 per cent.

- **GTA+Hamilton (GTAH) Smart Commute:**

York Region led this \$6.7 million initiative that promoted sustainable transportation alternatives such as transit and carpooling. Metrolinx has assumed the lead role in furthering the Smart Commute Initiative. Objectives of the program include: reduced traffic congestion, reduced emissions; ride matching services; three per cent drop in Single Occupancy Vehicle modal share and vehicle kilometers traveled; and 150,000 tonne of greenhouse gases avoided per year by 2010. Results are shown in Table 7:

Table 7
GTAH Smart
Commute Impacts
(May 2004 – March 2007)

Indicator	Measured Reduction
Single Occupancy Vehicle Trips	1,269,000
Vehicle Kilometres Travelled	75,751,000 km
Greenhouse Gas Emissions	17,425 tonnes
Criteria Air Contaminants Emissions	105,100 kg

The Natural Environment – Greening Strategies

Urban forests sequester gaseous air pollutants and particulates, and aid energy conservation by transpirational cooling, shade, and wind reduction. Greening Strategies offset emissions through carbon sequestration and can also achieve emission reduction through energy conservation by shading buildings. Other benefits are improved aesthetics, increased property values and improved storm water management. Forests have a substantial environmental, social and economic benefit to York Region.

Action:

Through the Greening Strategy, York Region administers several projects and programs to increase forest cover, protect and enhance our natural heritage system and create new wildlife habitat. These include: the York Region Forest Conservation By-Law, Greenlands Property Securement Strategy, Enhanced Street Planting Program, Urban Forest Enhancement Program, the Afforestation Initiative, the Significant Woodlands Study and Constructed Wetlands.

Community Education and Awareness Strategies

Education and awareness can achieve substantial emission reductions. York Region plays a key role in clean air stewardship by developing communications and education strategies that create awareness and promote action in the community. Understanding why and how personal actions impact air quality is necessary to bridge the connection between individual, local and global impacts.

Action:

- **20/20 The Way to Clean Air Program:** In 2006, the 20/20 campaign reached over 12,000 GTA households. Based on a self-reporting survey, participants achieved average reductions of approximately 25 per cent in home energy use, and 19 per cent in vehicle kilometres driven, a combined reduction of 2.6 tonnes of greenhouse gas emissions per household.
- **Expanded Blue Box Program:** The Yes! Blue Box Campaign utilizes advertisements and brochures to educate residents on new items being accepted in blue boxes and on the fate of recycled items. This program received a Gold Medal in the promotion category from the Recycling Council of Ontario.

Financing Local/Regional Initiatives

York Region has financed a number of initiatives through partnerships and government funding. York Region has accessed federal government funding for various projects and is investigating ways to lower its energy costs, reduce emissions and support a number of technical and environmental studies and pilot projects.

Action:

- **Green Municipal Fund:** The Region has received funding from the Green Municipal Fund for the VIVA Rapid Transit system and for Building Energy Feasibility Studies.
- **Transport Canada Funding:** In partnership with local municipalities and partners, York Region received funding from Transport Canada's Urban Transportation Showcase program for a GTA Travel Demand Management Program (the GTAH Smart Commute initiative described above).





6

Setting Goals and Targets

Goals are essential to ensure that continual progress is made in achieving targets and in measuring success of emission reduction efforts. Identifying corporate-wide emission reduction goals and targets requires consideration of the significant growth challenges facing the Region today and in the future. Forecasted population increases (Places to Grow legislation) will result in increased demand for Regional services (transportation, water and wastewater and energy infrastructure), and potential increases in emissions from the delivery of these services.

An overall corporate target for greenhouse gas and criteria air contaminants emission reductions is difficult to set in a Regional municipality experiencing such a high rate of growth. In order to respond to and service growth, additional resources are required such as transit buses and water and wastewater services. Therefore, Clear Air Action Plans will focus on initiative-specific targets.

All Clean Air Action Plans will include targets to track and measure the success of each initiative. Appropriate targets will be established that allow for the tracking of all initiatives, including those that are less quantifiable in terms of tonnes or percentages of emission reductions. While targets must be set based on a thorough review of existing and future operations and a cost benefit analysis of clean air actions, they can be aggressive and achievable – thus demonstrating the Region’s commitment to improving air quality and reducing emissions.



7

Evaluating Clean Air Actions

As implied in the Strategy principles, evaluation of clean air initiative is required at two stages – to select the clean air initiatives and to verify their progress and success.

In the first phase, Screening and Selection Evaluation, proposed initiatives are evaluated to ensure that they support the Strategy principles and will result in reduced emissions. The second evaluation, Monitoring and Verification, will demonstrate the success and applicability of each initiative through measuring and reporting of emission reductions or other appropriate indicator.

Each clean air action plan should outline the evaluation methodology, indicator of success and expected results. The importance of selecting the most appropriate evaluation tool and indicator of success is described later in this section.

Evaluation Phases

Screening and Selection Evaluation

The initial evaluation criteria used by the Task Force to identify clean air measures included environmental and health impact, cost, and implementation considerations. The evaluation was applied to each initiative with varying degrees of rigor, dependant on the availability of data and mechanisms to measure impacts, benefits and costs. To be consistent with the Sustainability Strategy, new evaluation criteria is based on triple bottom line principles that examine the consequences of the measures on the environment, economy and society.

On the environmental side, type and quantity of emissions released must be identified. Examples of key health benefits of improved air quality are reduced visits to hospitals and fewer asthma attacks. Economic benefits can be achieved through cost savings by reduced energy consumption and by encouraging local business ventures and influencing market demand. Economic considerations of implementing

an initiative include replicability, life-cycle costs, funding opportunities and payback periods. Key social benefits are improved health and increased awareness of the link between community design and air quality, physical activity and mental health.

Monitoring and Verification Evaluation

Evaluating the effectiveness of clean air initiatives is integral to the success of the Strategy. Many initiatives may be included in the Strategy, but some may be more readily measured for emissions reductions (e.g. electricity use translated into tonnes of greenhouse gases emitted). Other than greenhouse gas and criteria air contaminants emission reductions, success can be measured through other indicators as will be described later. Different data is collected to calculate emissions – utility bills for building retrofits; fuel cost and consumption for fleet measures. It is important to recognize that emissions follow different trends depending on technologies used, and calculation methodologies. For example, alternative fuel greenhouse gas emissions are typically calculated from a life-cycle perspective while gasoline and diesel emissions are based on tail-pipe exhaust emissions.

Education and awareness programs can be evaluated for participant feedback and behaviour changes. Based on results from such surveys, assumptions may be made on how energy consumption has changed as a result of the programs and emissions generated can be derived.

Calculating the emissions impacts of planning and roads initiatives is challenging. Regular reporting on statistics such as traffic flows, operation of single-occupancy vehicles, and transit ridership can provide overall indications on success. Similarly, success of greening strategies are best handled through indicators such as tree cover and amount of forest owned by the Region.

Selecting Appropriate Indicators of Success

Various indicators, or measures, can be utilized to evaluate the success of clean air initiatives. The following example demonstrates the importance of selecting the appropriate indicators (e.g. increased transit ridership, decrease in community emissions by reducing single occupancy vehicle use, emissions avoided through fuel switching, per capita emissions).

York Region's updated baseline inventory for 2004 in the Partners for Climate Protection Program identifies 55,535 tonnes of greenhouse gas emissions from Regional operations and estimates future emissions forecasts. By considering effects of projected population growth and the resultant increase in Regional operations, it is predicted that over 61,000 tonnes greenhouse gases will be generated in 2010 if no emission reduction measures were undertaken. Greenhouse gas emissions can be expected to increase in certain sectors, such as public transit, despite the implementation of clean air measures. For example, YRT is planning to acquire 85 more buses to support ridership, which is expected to increase to 26,850,000 by 2010, a 244 per cent growth from 2004. While alternative fuel options are being considered for transit fleets, the growth in the fleet can be expected to increase total emissions.

Selecting increased transit ridership as the indicator in the above example will demonstrate the success of this clean air initiative because it results in decreased emissions from single occupancy vehicles.

Evaluation Tools and Indicators of Success

There are a wide range of evaluation methods and tools to monitor and measure success of clean air initiatives. Different measures are better suited to different initiatives. In lieu of evaluations that may be resource intensive and to complement more rigorous evaluation, various indicators can be used to demonstrate success of measures. Examples of measurement tools and indicators are outlined in Table 8.

Table 8
Measurement Tools and
Indicators of Success

Tool	Example	Indicator of Success
Emissions Inventory	EEMS Corporate Emissions Inventory	Quantifiable Emission Reductions
	HEAT – Harmonized Emissions Analysis Tool (FCM & ICLEI)	Quantifiable Emission Reductions
Population (Census and Local Survey Data)	York Region Population	Per Capita Emissions Reduction
	Transit Ridership	Increase in Transit Ridership
	Smart Commute	Smart Commute Participation Rate
	20/20 The Way to Clean Air	Reported Emissions Reductions
	Traffic Surveys	- Reduction in Traffic Volume - Improved Traffic Flow
Case Studies	Pilot Programs (e.g. testing new technologies for fleets such as YRT)	Savings (fuel consumption, emissions, cost) as a result of the pilot
Capital Inventory	Alternatively Fuelled Vehicles	# Hybrid Vehicles in Fleet
	Energy Efficient Buildings	# LEED Buildings # Energy Efficient Building Retrofits
	Greening Strategies	- Acreage of Regionally-Owned Forests - Tree cover in Rural and Urban Area
Regional Policies	Green Procurement Policy	# Environmentally-friendly Products purchased - Amount of Green Power Purchased
	Anti Idling Policies	# Fleets Adopting Anti-idling Policy - Fuel (and emissions) Savings as a result of Anti-idling
	Land Use Planning Policies	Amount of In-fill and Intensification Development
Modelling	Urban Forests Effects Model (US EPA) Air Quality Modelling (GTA-CAC)	Evaluation of forestry initiatives Forecasted improvements to air quality as a result of clean air initiative
Measurements	Mobile Monitoring Equipment	Measured improvements to air quality as a result of clean air initiative



8

Conclusion and Recommendations

The Corporate Air Quality Strategy provides a set of tools to support the integration of clean air actions into daily operations and long-term planning at York Region.

York Region is actively promoting and implementing measures to reduce emissions, however current initiatives could be enhanced by setting achievable targets, and strengthening collaboration among Regional departments, area municipalities and external agencies.

In support of the Sustainability Strategy, the Corporate Air Quality Strategy can achieve emission reduction successes and contribute to the decision-making process about growth management and municipal responsibilities that better integrate the economy, environment and community.

The Strategy also addresses the challenges of meeting the Corporate Clean Air Task Force's mandate to reduce emissions in a growing Region. Implementation of the Strategy Recommendations will help ensure that the goals set out in the Corporate Clean Air Task Force Terms of Reference are met – improvements in air quality, reductions in criteria air contaminants and greenhouse gases and leadership in environmental initiatives related to emissions.

Recommendations for Future Clean Air Activities

Recommendation #1:

The Strategy Principles be the basis for action to continuously improve air quality and reduce greenhouse gas emissions

Recommendation #2:

A Clean Air Committee be established and coordinated through the Office of the CAO, with Commissioner, Branch Director or General Manager representation from all departments, to ensure that the implementation and reporting on clean air measures is a priority for the Region.

Recommendation #3:

Climate change adaptation strategies be developed to help communities prepare for local impacts, and be reviewed by the Clean Air Committee, and implemented in collaboration with all government and community partners.

The Strategy Principles are:

- **Principle 1:** Ensuring that Air Quality and Climate Change are Corporate Priorities
- **Principle 2:** Building On and Supporting Ongoing Regional Initiatives
- **Principle 3:** Identifying New Clean Air Initiatives
- **Principle 4:** Collaborating with Regional Stakeholders
- **Principle 5:** Measuring and Reporting our Success

The Clean Air Committee would be responsible for:

- **Developing** an implementation plan including the identification of gaps, targets, responsibilities and timeframes
- **Ensuring** departmental progress in terms of emissions reductions and air quality impacts
- **Presenting** an annual Clean Air Report to include an emissions inventory and indicators of progress on major clean air initiatives
- **Recommending** greenhouse gas and criteria air contaminant targets based on a cost-benefit analysis of the suite of clean air initiatives
- **Ensuring** adequate human resources and technology to track emissions, quantify emission reduction potentials and explore financial opportunities to offset cost of clean air initiatives
- **Exploring** opportunities to offset costs of clean air initiatives
- **Developing** and implementing climate change adaptation strategies
- **Ensuring** that links between departments are used to increase awareness of air quality, climate change and human health impacts of land use planning and the built environment
- **Using** tools to monitor, measure and finance clean air initiatives

Municipalities play a vital role in planning for and managing the significant potential health impacts and infrastructure risks associated with climate change. These include adaptation and response capacity, policy development and public outreach and engagement. Climate change adaptation means making adjustments that reduce the adverse impacts of climate change and preparing for its unavoidable consequences.

Recommendation #4:

Regional Departments use the principles, evaluation tools and best practices identified in the Corporate Air Quality Strategy to complete Clean Air Action Plans and set targets for each action plan consistent with Regional targets.

Success of clean air initiatives will require:

- **Development** of performance measures and setting targets
- **Keeping** abreast of Federal and Provincial policy developments, funding opportunities, new technologies, and municipal best-practices
- **Consultation** with stakeholders, including area municipalities, and participation on collaborative projects
- **Collaboration** between Regional departments and fostering of partnerships external to the Corporation, and
- **Reporting** on new clean air initiatives, and evaluating successes of existing initiatives, through the Clean Air Committee

Tools to Track, Measure and Monitor

Recommendation #5:

The Region plan for the implementation of the *Energy Conservation Responsibility Act*.

The Energy Conservation Responsibility Act, or Bill 21, focuses on building energy use and enables the development of smart metering as well as the *Energy Conservation Leadership Act*. Smart metering encourages clean air through reducing peak demand for electricity. *The Energy Conservation Leadership Act* will mandate energy conservation within the municipalities, universities, schools and hospitals sector and may include a requirement to report on emissions and/or energy savings.

Recommendation #6:

The Region meet its commitment of monitoring progress and reporting results under the Partners for Climate Protection Program called Milestone Five.

Recommendation #7:

Clean air measures be consistently evaluated through a 'triple bottom line' analysis based on environmental, economic and community impact.

Tools to Track, Measure and Monitor (continued)

Recommendation #8:

Indirect emissions from electricity use and direct emissions from fuel use be tracked through York Region's Energy and Environment Management System (EEMS), reported annually and accompanied by an operations inventory of leased and owned facilities.

Recommendation #9:

Investigate tools and supports from governments and non-government agencies to prioritize, implement and measure clean air actions in partnership with government and non-government agencies.

Tools to Finance Clean Air Initiatives

Recommendation #10:

A revolving fund be developed whereby monetary savings from energy retrofits and conservation efforts be used to fund Regional clean air initiatives.

Recommendation #11:

Government grant and incentive programs, and community and business partnerships be investigated and utilized in order to support the implementation of clean air initiatives.

Recommendation #12:

Options such as emissions trading and carbon offsets be examined to finance and showcase clean air initiatives.



Department-Specific Clean Air Action Plans

Recommendation #13:

Each proposed departmental initiative be clear and specific in Clean Air Action Plans so that emissions reductions can be quantified.

Action Plans will be developed for all initiatives such as:

- **Green Fleets Plan:** Use alternatively fuelled vehicles (e.g. hybrids), alternative fuel (e.g. biodiesel) and end of pipe technologies, right-sizing vehicles, anti-idling practices, driver education, and maintenance practices.
- **Regional Green Procurement Policy:** Establish Energy Star guidelines, goals and targets for environmentally-sound purchasing. Communicate the policy to purchasers throughout the Region.
- **Corporate Energy Conservation Policy and Employee Energy Conservation Policy:** Develop policies to encourage employees to conserve energy at their areas of work.
- **Master Water Efficiency Plan:** This plan includes energy feasibility studies which are expected to identify significant energy savings and provide York Region with a roadmap for water efficiency programming for the next 10 years.
- **Corporate Solid Waste:** Establish a baseline and targets for corporate solid waste generation and diversion, and develop a corresponding greenhouse emissions baseline.
- **Smart Commute York Region:** Continue to reduce Regional employee personal vehicle use for commuting to work and for work purposes, and provide recognition and reward for employees that participate.
- **Land Use Planning and the Built Environment:** Address the links between air quality, climate change, public health, and land use and transportation planning. Provide support for Regional Planning initiatives in order to meet or exceed the 40% intensification goal targeted by the Provincial government.

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APPENDIX A – EXISTING AND PROPOSED CLEAN AIR INITIATIVES

1. Energy - Achieves Emissions Reductions by Reducing Energy Consumption		
Initiative	Description	Status
Strategic Energy Plan	The Region is developing a Strategic Energy Plan (SEP) that will provide a strategic vision incorporating all Regional departments. The plan will provide a framework for advancing the Region from its current state of energy management to the preferred state of energy sustainability. The plan will provide recommendations for energy management that are consistent with and build upon the Region's Vision 2026, Sustainability Strategy and the Corporate Air Quality Strategy	The Strategic Energy Plan recommendations will be presented to Senior Management and Regional Council in 2008.
Building Energy Feasibility Studies	This multi-phased project employs building condition audit reports, on-site inspections and measurements to identify potential modifications to Regional facilities to reduce energy consumption. Examples include lighting and mechanical systems retrofits, building envelope retrofits, demand-side response practices and tenant education.	Initiated in 2004, York Region continues to perform building energy feasibility studies. The first set of studies examined 20 Regional facilities, including the Administrative Centre, York Regional Police, Long Term Care, and Works facilities. With results from these studies, Phase 1 of energy retrofits was implemented for Administrative Building. The second phase of energy retrofits involving 11 facilities, approx. 432000 ft ² build up area is presently being implemented. A Water and Wastewater Energy Feasibility study has been completed and recommendations provided to the branch for implementation. A mechanism to review building energy feasibility as a component of Building Condition Assessment (BCA) is under review.
Building Retrofits	Subsequent to building energy feasibility studies, the 497,000 ft ² Administrative Centre was subject to a comprehensive energy retrofit which included energy-efficient lights and control systems, heating, ventilation, air-conditioning (HVAC) mechanical equipment upgrades and water-efficient technologies.	The Administrative Building realized \$186,000 in annual utility savings in 2006 as compared to the baseline consumption. The energy retrofits have resulted in annual reduction of 1,023,517 units of electricity consumption and over 211,098 m ³ of natural gas. The GHG emission reduction for 2006 was estimated to be 2,482 t eCO ₂ . The second phase of energy retrofits involving 11 facilities is presently being implemented. Once completed, the retrofit project is estimated to reduce 543,000 units of electricity consumption, 75,000 m ³ of natural gas and 273 t eCO ₂ / year. (continued next page)

1. Energy - Achieves Emissions Reductions by Reducing Energy Consumption – con't –

		<p>Between 2004 and 2006, various buildings in the Housing York Inc. portfolio underwent extensive lighting, and HVAC retrofits, at the cost of \$468,000.</p> <p>In 2007 two facilities underwent comprehensive studies and retrofits, which are estimated to provide \$45,000 of energy cost savings. The energy savings in these two buildings equate to a reduction of 50 tons of GHG emissions.</p> <p>Ten more buildings underwent partial energy retrofits over the balance of 2007 resulting in an additional \$30,000 in energy savings.</p> <p>On December 5, 2007, the Board of Directors of Housing York Inc. approved a report authorizing energy management retrofits on 25 HYI buildings over the next five years at a cost of \$3.5 million dollars. When the five year program is complete, the energy saving measures are expected to reduce energy costs by \$480,000.</p>
Corporate Recycling Program	In response to Ontario Regulation 102/94 regarding waste management in government facilities, the Region has developed a Corporate Recycling Program. By using the blue bins for co-mingled recyclables, the new program proposes that staff become stewards of their own waste and deposit collected recyclables and waste into centralized units in kitchenettes and main corridors.	<p>The Corporate Recycling Program has been piloted at the Administrative Building. A waste audit before and after the program will quantify the changes in the waste diversion rate. New waste/ recycling combination disposal units will also be placed in the public corridors and centralized areas within each department. Upon completion of a successful pilot, the program will be implemented at other Regional facilities and considered for leased Regional facilities.</p> <p>Housing York Inc. is currently in the design stage of a new seniors apartment building in the City of Vaughan. It is being designed to handle three stream waste management.</p>
Water for Tomorrow	The Region's Water for Tomorrow program began in 1998 to increase water efficiency and reduce water consumption through the use of low-flow shower heads, early-closing toilet flappers, water saving audits and public education. Water efficiency reduces the load on Regional water pumping and treatment facilities, thus reducing electricity consumption. Use of low-flow shower heads reduces natural gas consumption by reducing the amount of hot water used.	These measures provide 7,420, 450 m ³ of annual water savings, contributing to 7,420,450 kWhs of electricity savings, resulting in 2,063 t of GHGs reductions. The showerhead program saves an additional 6,511,024 m ³ of natural gas annually, resulting in 12,312 t of GHGs reductions. In total 14,375 tonnes of GHG emissions is avoided annually.

1. Energy - Achieves Emissions Reductions by Reducing Energy Consumption – con't –		
Master Water Efficiency Plan	The Master Plan will provide York Region with a roadmap for water efficiency programming for the next 10 years. The Master Plan also includes energy feasibility studies at Regional Water and Wastewater facilities which are expected to yield significant energy savings.	The Master Water Efficiency Plan Update Report was completed in 2007 and is anticipated to reveal energy and emission reductions in addition to those achieved through the Water for Tomorrow program. This year (2008) the Region will commence implementation of some of the recommendations from the Update Report.
Request for Information – New and Emerging Clean Air Solutions	<p>In 2005, York Region issued an RFI for New and Emerging Clean Air Solutions. The objectives of the RFI process were to:</p> <ul style="list-style-type: none"> • Identify new and emerging clean air measures and associated costs and benefits (e.g., emission reduction, health and environmental benefits, local economic development, operating savings, return on investment and environmental leadership potential). • Provide a fair and open mechanism for private industry to offer a clear value proposition for Region consideration. • Achieve maximum financial leverage through public-private partnerships. 	As a result of this RFI process the Region is evaluating the feasibility of a wind-solar project at one site.
Wind Power Initiative	Instead of purchasing green power from the grid, the Region decided on a 'behind-the-meter' strategy for wind power initiative. This implies that green power production and use will occur at a particular Regional facility. It will reduce the amount of conventional power, generated by fossil fuel plants, demanded by the Region.	In order to investigate the implementation of this initiative, a multi-stage project is in progress. Sutton Water Pollution Control Plant (WPCP) was identified as a promising site for wind energy development and was selected to conduct a site specific feasibility study. A 60-meter meteorological tower was installed in September 2007 for wind resource monitoring. The study will investigate the possibility of installing a single wind turbine at the Sutton WPCP. With the favorable business case analysis, the next stage will be to design and install a wind turbine at Sutton WPCP.
Green Power Purchasing	Purchasing green power means purchasing electricity that is generated by renewable and sustainable sources, such as wind. This displaces emissions from fossil fuel generating facilities by funding alternative energy generators. The green premium will support wind and low-impact hydro generators.	In May 2007, the interim electricity procurement strategy adopted by Council recommended purchase of green power for two Regional facilities. The initiative is estimated to reduce 1,715 t eCO ₂ . The Request for Proposal has been released to select the green power electricity supplier.

1. Energy - Achieves Emissions Reductions by Reducing Energy Consumption – con't –

LEED Silver certification for all new Regional buildings	<p>The Canada Green Building Council website states that: "The LEED® Canada-NC 1.0 Rating System recognizes leading edge buildings that incorporate design, construction and operational practices that combine healthy, high-quality and high-performance advantages with reduced environmental impacts". A building constructed to LEED standards consumes at least 25% less energy than its conventional counterpart, which leads to at least 25% less emissions generated.</p>	<p>In April 2006, York Regional Council approved LEED Silver as a minimum sustainable design and construction standard for new Regional facilities over 500 m².</p> <p>Joint Fire / EMS station #79 in Vaughan has been awarded LEED Gold certification by Canada Green Building Council. Some of the key benefits include: 35% better energy performance, 55% potable water use reduction and 58.6 t eCO₂/year emissions reduction. There are Regional facilities in various stages of implementation pursuing LEED certification - Tom Taylor Place in Newmarket, Stouffville Zone 2 Pumping Station, Vaughan Community Environmental Centre and a Police facility in Aurora.</p> <p>Tom Taylor Place is a 50 unit apartment building currently under construction in Newmarket. It will be opening in 2008 and will be the first LEED Silver building constructed by HYI. Another LEED building is in the design stage and is expected to be built on the new Vaughan Civic Centre campus in 2009.</p>
Traffic and Pedestrian signal LED retrofit	<p>On average, traffic and pedestrian signals with energy efficient light-emitting diodes (LED) use 90% less electricity than incandescent bulbs.</p>	<p>Starting in 2002, the incandescent lights in traffic signals and pedestrian lights were retrofitted with energy efficient light-emitting diodes. It is estimated that 1,700 t eCO₂ are avoided by this retrofit in 2004, and annually, more than 120 t eCO₂ are avoided when new traffic and pedestrian signals are installed.</p>
Light Emitting Diodes Street Lights	<p>The Region operates approximately 5000 street lights, with conventional high-pressure sodium lamps, on Regional roads. The Region and local road authorities typically use a range of 200 to 400 watt high pressure sodium (HPS) incandescent lamps for street lights to provide adequate light dispersion. Some jurisdictions are piloting the use of light emitting diode (LED) technology which uses substantially less electricity.</p>	<p>To date, LED street lighting has not been accepted by recognized street lighting authorities as an equivalent technology due to the light dispersion requirements. For instance, to attain the light dispersion of one HPS street light, three LED street lights are required. It is anticipated that LED street lighting technology may improve over the next 10 years in order to be able to provide sufficient illumination.</p>
Solar Powered Flashing Beacons	<p>The use of Solar Powered Flashing Beacons can reduce electricity use and associated emissions by relying on solar power rather than fossil fuels.</p>	<p>The Transportation Services Department conducted a pilot study to examine the benefits and feasibility of using solar power for flashing beacons. This pilot concluded the solar technology with battery support is an appropriate technology. As a result future installations of flashing beacons may use solar rather than electricity.</p>

1. Energy - Achieves Emissions Reductions by Reducing Energy Consumption – con't –		
Solar Powered Transit Shelters	A pilot project was conducted with the installation of 10 solar powered transit shelters.	The solar powered units provide internal shelter lighting and avoids power costs and electrical connection to the shelter. There has been positive results to date and the pilot project will be completed in early 2008. There are plans to expand the number of solar powered shelters in 2008.

2. Procurement Strategies - Achieves Emission Reductions through Purchasing of Supplies and Services that Limit Energy Use in Productions and Operations		
Initiative	Description	Status
Green Purchasing	In June 2002, the Governments Incorporating Procurement Policies to Eliminate Refuse (G.I.P.P.E.R) Statement of Principle was adopted by Regional Council. The G.I.P.P.E.R. Principle gives direction on how to perform environmentally responsible purchasing by giving consideration to the 3 Rs (reduce, reuse, recycle) and toxic content of materials.	<p>The Region is developing a Green Procurement Policy that will enhance the environmental purchasing program. Under the procurement policy, if a bid documents requests 'green' products and services, preference may be given to proponent offering this service. Staff are also exploring a policy that would require 2008 suppliers of certain goods and services to prove they have 3rd part certification such as the eco logo in order to be acceptable for use by the Region.</p> <p>Purchasing courses are available to educate staff on green procurement. This initiative is important because for purchases under \$10,000, departments may purchase items directly from the vendor, with no guidance from Supplies and Services.</p> <p>York Region operates Energy Star-rated computers. During "sleep-mode", these computers consume less power than conventional counterparts resulting in 120 t GHG avoided annually. Use of liquid crystal display (LCD) monitors instead of cathode ray tube (CRT) technology reduces power consumption by 60%, per monitor. By 2007, all monitors will be LCD, resulting in an avoided 80 t GHG annually.</p>

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels

Initiative	Description	Status
Hybrid vehicles	<p>There are two main levels of hybrid vehicles. While both levels use only electricity when idling and utilize regenerative braking to generate electricity, a 'strong' hybrid conserves fuel by allowing the driver to only use electricity, at low speeds, and providing supplemental power to the gasoline engine during intensive activity. Given these characteristics, optimal performance of hybrids occurs when used for city driving. Some hybrids have other technologies that reduce tailpipe emissions.</p> <p>Hybrid vehicles have demonstrated fuel and emissions savings, leading to decreased fuel costs and improved air quality. Provincial and Federal rebates are offered for qualifying hybrid vehicles. These rebates in addition to the fuel savings payback make the hybrid vehicles economically attractive compared to conventional vehicles.</p>	<p>The Hybrid program for the Transportation and Environmental Services Departments was initiated in 2006 and expanded to include an additional 8 units as of 2007.</p> <p>York Region Transit currently operates 5 hybrid sedans and 2 hybrid pick up trucks.</p> <p>Possible further expansion for other business groups as suitable units become available from manufacturers.</p> <p>Hybrids are economically attractive on initial purchase due to the various federal/provincial rebate programs. They have not, however been in service long enough to determine overall costs associated with repairs/maintenance and end resale values.</p> <p>While the number of hybrids utilizing a 4 cylinder engine/ electric motor combinations has increased from 4 to 12 vehicles in Transportation Services section, other departments have remained unchanged but have included smaller 4 cylinder engines when vehicles are replaced.</p>

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels – con't –

<p>Biodiesel:</p>	<p>In general, vehicle performance with biodiesel use is comparable to conventional fuel, and improves in certain circumstances.</p> <p>During Canadian testing of biodiesel - B20, buses in Halifax, Brampton and Saskatoon recorded averages of 18% reduction of particulate matter and 16% reduction of carbon monoxide[†]. Use of biodiesel releases 73% less CO₂ when B20 is used, according to lifecycle calculations[‡]. Other municipalities in south-western Ontario have started using biodiesel in their fleets, from buses to garbage trucks. Most notably is Brampton, which has been using biodiesel in its public transit for the 4 past years with great success.</p> <p>In 2006, there was a fuel tender issued by the York Public Buyers' Co-operative. Two companies offered 20% biodiesel blended with ultra-low sulphur diesel (B20), and three offered B5. Depending on the company, the price ranged from a premium of 6 cents per litre and to a discount of 2 cents.</p>	<p>York Region's Roads Operations Branch initiated a B5 Biodiesel trial in the summer of 2007, and has a proposed B20 trial scheduled for implementation for the upcoming 2008 summer months. Overall mileage figures for the heavy duty trucks showed a slight decrease, while emissions reductions were determined to be negligible.</p> <p>All three fleet sections used the B5 bio product, with relatively few operating problems being recorded over the trial period.</p>
<p>Ethanol</p>	<p>Using ethanol improves vehicle performance since it increases the amount of oxygen available for combustion. Its 35% oxygen composition also means that more fuel will undergo complete combustion and fewer harmful pollutants will form. According to the Canadian Renewable Fuels Association, E10 will reduce smog-generating emissions such as CO by 25%-30%, PM by 50% and VOCs by 7%[§]. Blends up to E10 can be used in existing vehicles without modifications.</p> <p>Fuel economy is slightly lower for ethanol than gasoline, but likely negligible for the average driver. Unlike biodiesel, there are no complications with using ethanol in cold weather climates. In fact, it may prevent problems because it acts like an anti-freezing agent. E10 was only offered by one vendor in the 2006 fuel tender, and at the same price as regular unleaded gasoline.</p>	<p>E10 or 10% ethanol content fuel has been bulk purchased and utilized by the Region's four patrol yards since November 2006. A 5% ethanol content in all gasoline fuels was legislated by the Federal Government and implemented in January 2007. As of January 2010, there is a further increase to 10% ethanol content in all gasoline fuels. All three sections used the E10 fuel. Mileage figures virtually remained unchanged.</p>

[†] Biodiesel in Transit and Municipal Fleets [Internet]. c2007 [cited 2008 02/02]. Available from: <http://www.tc.gc.ca/programs/Environment/utsp/biodieselintransitandmunicipalfleets.htm>.

[‡] Biodiesel in British Columbia: Feasibility Study Report. [Internet]. c2004 [cited 2007 12/04]. Available from: http://www.wd.gc.ca/rpts/research/biodiesel/default_e.as.

[§] Ethanol [Internet]. c2005 [cited 2007 January 10, 2007]. Available from: <http://www.greenfuels.org/ethanol/index.htm>.

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels – con't –

Propane and Natural Gas	According to Environment Canada, propane produces up to 20% fewer emissions. Another alternative fuel, natural gas burns more cleanly and efficiently than gasoline or diesel fuel, also producing fewer emissions. Between 1989 and 1997, the majority of the T&W fleet was comprised of propane vehicles, but technical problems, lack of availability as well as lack of support from manufacturers resulted in the phasing out of propane.	Propane and Natural gas are not being considered at this time due to the lack of refueling stations throughout the Region. Presently Manufacturers are not supplying engines suitable for utilizing these fuels.
York Region Transit Diesel Electric Hybrid Buses - Pilot Project	Diesel electric hybrid buses improve fuel economy and reduce exhaust emissions. This is achieved through the use of a smaller diesel engine operating at a more constant speed which powers an electric drive motor. Also, the braking action of the bus generates electricity which is stored for use when the bus is accelerating.	YRT will be preparing specifications and proceeding with the procurement process for five diesel-electric buses for testing purposes in 2008.
York Region Transit Bio-Diesel Fuel Pilot Project	Biodiesel fuel is a made from a blend of vegetable oils and regular diesel fuel. The use of biodiesel fuel results in a reduction in carbon monoxide, hydrocarbon and particulate matter exhaust emissions. Test information from YRT and the U.S. Department of Energy indicate that emission levels are reduced by over 20% in all three areas.	In 2007, YRT successfully completed a trial on the use of B20 and B5 bio-diesel on five Viva buses. Bio-diesel will be used on all 90 Viva buses in 2008 subject to continued successful winter testing and approval of the 2008 Business Plan and Budget. Further review is required to determine the feasibility of expanding the bio-diesel fuel use to all York Region Transit buses.
End of Pipe Technology	<p>Emissions from vehicles may also be reduced by employing end-of-pipe technologies that remove pollutants. Examples of this type of technology include diesel particulate filters, catalytic converters, exhaust gas recirculation systems and positive crankcase ventilation systems.</p> <p>Diesel particulate filters, which have replaced the muffler on some vehicles, can be installed as a retrofit or can be included as original equipment. As exhaust gases pass through the filters, 50% to 90% of the particulate matter is trapped.</p>	

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels – con't –

	<p>In a project with the Canadian Urban Transit Association, more than 330 transit buses in 15 Canadian cities, built between 1990 and 1993, have been retrofitted with Diesel Oxidation Catalysts (DOCs). DOCs reduce exhaust emissions of PM by 20%, CO** by 40% and VOCs by 50%. Emissions reductions from end-of-pipe technologies can be estimated from manufacturer specifications of technology and from Drive Clean Test results.</p>	<p>The Engine manufacturers were legislated to reduce harmful emissions in all vehicle engines as of January 2004. The initial emission reductions started in January 2004, will be further reduced in 2007 and have a final more stringent reduction in 2010. The various engines utilize different methods to achieve the legislated emissions reduction in each phase.</p> <p>No retrofitting of existing engines has been done to date. The older existing diesel engines will be replaced through the fleet replacement program and phased in over the upcoming years. Off-road equipment engines will be included in emissions reductions over the next few years.</p>
Right Sizing of Vehicles	<p>Fleet rightsizing involves matching fleet vehicles to the required function. In some cases, the analysis may identify that a vehicle is not necessary at all. If the vehicle purchased is properly matched with its function, less fuel may be consumed and fewer emissions will be generated. For example, if a large car uses 12 litres of gasoline to travel 100 kilometres and a compact car uses 7.7 litres to drive the same distance, then over its average life span (200,000 kilometres), the large car will burn an additional 8,600 litres of fuel.</p>	<p>A fleet 'Right-sizing' survey was undertaken by the Roads branch in 2007. Business groups were asked to review their operations to see if the current vehicle type met the needs of the group was fully utilized or could be replaced with a smaller more efficient vehicle, as long as business functions were not compromised. The exercise resulted in the downsizing of several vehicle types and an overall reduction in fleet numbers in some business entities. Spare, and under utilized vehicles were reviewed and reduced where possible, resulting in a vehicle pooling system among staff being implemented over several business units.</p> <p>Several of the larger vehicle types have to remain as they are, to allow business functions to continue. Both York Regional Police and Roads have purchased smaller, fuel efficient 4 cylinder vehicles as replacements for older large units that traditionally had bigger engines.</p>

** Carbon Monoxide [Internet]; c2006 [cited 2007 02/02]. Available from: http://www.ec.gc.ca/cleanair-airpur/CO-WS139689AB-1_En.htm.

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels – con't –

Fleet Maintenance Practices	<p>Combined with inspection and monitoring of condition and performance, repair and replacement activities contribute to improved fuel efficiency and emission reductions. York Region fleets currently perform these activities or outsource them to local businesses. NRCan suggests that poorly maintained vehicles may increase fuel consumption by 15%.^{††}</p> <ul style="list-style-type: none"> • Energy-conserving oils can result in as much as 2.7% less fuel use than with other oils. • Regular maintenance of the vehicle's ignition system is critical in maximizing fuel efficiency. A misfiring engine wastes fuel, produces higher levels of emissions and generally performs poorly. • Operating a vehicle with just one tire under-inflated by 8 psi (56 kPa) can reduce the life of the tire by 15,000 kilometres and increase the vehicle's fuel consumption by 4 percent. <p>In general, the impacts of inspection and maintenance practices on clean air must be inferred from fuel consumption. Results from Drive Clean tests would also indicate successes.</p>	<p>Fleet Services utilizes synthetic oils in high mileage patrol vehicle engines which are exposed to extreme weather conditions and 24hr. continuous operation during the winter driving season.</p> <p>A comprehensive preventative maintenance program ensures that vehicles are serviced regularly, in accordance with the manufacturer's specifications and warranties, and may exceed those specifications in certain units that undergo extreme conditions. Routine as well as annual inspections and maintenance ensure that the vehicles are performing efficiently as required, and are monitored throughout the year.</p> <p>Regular emission checks are carried out as legislated by the Province, on the heavy duty units annually and the light duty units as required each year.</p>
Anti-Idling Policies^{††}	<p>An idling engine is at sub-optimal temperatures which lead to incomplete combustion and increased pollutant release. If a vehicle is not in use for more than 10 seconds, Natural Resources Canada advises a driver to turn off the engine which prevents wasting fuel and money, and generating pollutants^{§§}. Through the adoption of an anti-idling policy, corporate fleets could achieve cost-savings by reducing fuel consumption while ensuring that pollutant release remains at a minimum. To ensure maximum success of such measures, a supplemental education program should be implemented.</p>	<p>Transportation Services is currently drafting an Anti-Idling policy for vehicles and equipment under their control. It is expected that the draft will be completed in 2008, and may be available to other business groups to modify for their business needs.</p>

^{††} Anti-idling – CO2 Calculator [Internet]; c2006 [cited 2007 04/07]. Available from: <http://oee.nrcan.gc.ca/transportation/tools/co2-calculator/index.cfm?attr=8>.

^{††} Ready to Use Facts [Internet]; c2006 [cited 2006 02/02]. Available from: <http://oee.nrcan.gc.ca/communities-government/transportation/municipal-communities/articles/idling-tips.cfm?attr=8>.

^{§§} Natural Resources Canada: Office of Energy Efficiency. Ready to Use Facts. Accessed December 19, 2006. <http://oee.nrcan.gc.ca/communities-government/transportation/municipal-communities/articles/idling-tips.cfm?attr=8>.

3. Transportation – Corporate Fleets: Achieves Emissions Reductions by Reducing Fuel Consumption, Reducing Tailpipe Emissions and Selecting Cleaner Fuels – con't –

Driver Training	<p>Certain driving practices cause unnecessary fuel consumption, such as idling, aggressive driving, poor maintenance and poor trip planning. By educating drivers on fuel-efficient driving practices, fuel use and emissions generated can decrease significantly.</p> <p>NRCan offers several driver training programs that can be used to develop an in-house driver training program to reap environmental and financial benefits of better driving practices.</p>	Defensive Driving courses are available through the Corporate Learning program.
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4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies

Initiative	Description	Status
Sustainability Strategy: Towards a Sustainable Region	The purpose of the Strategy is to provide a long-term framework for making smarter decisions about growth management and all municipal decisions that integrate the environment, economy and community.	In November 2007, Regional Council adopted the York Region Final Sustainability Strategy: Towards a Sustainable Region. The strategy contains nine guiding principles and over 100 action items that will improve and inform all Regional policies, programs and operations. Next steps include an implementation plan with timing, responsibilities and outcomes.
Growth Management Strategy: Planning for Tomorrow	This includes a comprehensive Growth Management Review and Official Plan update. The strategy includes an update of the population and employment forecasts, a land demand/supply exercise (land budget), an examination of intensification opportunities, updated infrastructure (roads, water/wastewater) plans, an updated human services plan and a fiscal impact analysis to assess the costs of infrastructure and services required by growth.	Five separate growth forecast scenarios will be assessed using a number of models including fiscal impact, natural heritage system, water and wastewater, and transportation infrastructure requirements. This approach ensures that any updated policies in the Regional Official Plan will be coordinated with the updates to the Infrastructure.
Centres and Corridors Strategy	This strategy includes policies to promote more compact development within the Region's centres and corridors, and help to strengthen the relationship between land-use and transportation. This strategy will guide the move away from traditional suburban development forms to "city-building" through intensification. Increased development of alternative transportation infrastructure and its use could be used to measure impacts on air resources.	<p>In 2005, the policies of the Centres and Corridors Strategy were included in the Regional Official Plan.</p> <p>These policies will be updated and refined as part of the Growth Management Work currently underway.</p>

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies

Residential Intensification Strategy	<p>The Residential Intensification Strategy (a component of the growth management strategy) translates the Provincial 40% intensification target into absolute numbers and demonstrates how the target will be achieved. Urban design, appropriate scale and consistency with the Region's Transit Oriented Development Guidelines are keys to successful implementation.</p>	<p>The 40% intensification target equates to over approximately 85,000 new units within the Region's built boundary by 2031. The current rate of intensification is approximately 18%. Each area municipality has an intensification target and will be asked to prepare an individual implementation strategy to ensure that intensification locates in the appropriate areas.</p>
Provincial Planning – Places to Grow Act, 2005 and Plan, Greenbelt Act, 2005 and Plan and Oak Ridges Moraine Conservation Act, 2001 and Plan	<p>The Places to Grow Act provides a framework for the government to designate any geographic area of the province as a growth plan area and to develop a growth plan in consultation with local officials and stakeholders.</p> <p>The Growth Plan establishes the growth forecasts and urban development standards for that growth; establishes the Province's priorities for infrastructure investments; is intended to identify the natural heritage protection system which builds on that already contemplated within the Greenbelt Plan; and establishes the ways and means of providing for growth plan compliance through Regional and local Planning documents. The Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape. The Greenbelt Plan includes lands within, and builds upon the ecological protections provided by, the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP). The Oak Ridges Moraine contributes to the supply of clean and abundant drinking water, provides wildlife habitat, and contains prime agricultural lands. These plans ensure that growth plans consider a geographic perspective and promote a rational and balanced approach to growth that protects greenspaces and natural features that aid in pollution mitigation and intensification.</p>	<p>Conformity to the Growth Plan is being undertaken within the Region's Growth Management Initiative</p> <p>The Greenbelt Conformity exercise will be undertaken in 2008 as part of the Region's Growth Management initiatives.</p> <p>The Oak Ridges Moraine Conservation Plan was included in the Regional Official Plan through the approval of Regional Official Plan Amendment 41.</p>

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies - con't -		
Transportation Master Plan	Through integration of land-use and transportation growth management policies, long-term infrastructure that supports growth can lead to urban intensification. The decrease in vehicle use through reduced car trip distances and increased alternative transportation use by individual community members will result in avoided emissions.	An update to the Transportation Master Plan is on-going and is expected to be completed by the end of 2008. The growth management initiative that is concurrently being conducted will direct a significant amount of growth into intensification areas. The solutions to be recommended in the Transportation Master Plan (TMP) Update will reflect the practical choices that will be effective in a maturing and intensifying municipality.
Regional Transit Oriented Design Guidelines	These guidelines will serve to educate the public and development community alike on how to make communities and new development within those communities more transit-supportive and pedestrian-friendly. Success may be measured by monitoring quantity and quality of development applications along transit corridors through the Department's newly-developed Growth Management Information System, and observing increased use of transit and increased development densities.	"Made-in-York" TOD Guidelines will advance the implementation of the York Region Centres and Corridors Strategy and related Regional Official Plan policies. TOD Guidelines were adopted by Council September 21, 2006.
Green Development Award	York Region will promote environmentally sensitive design including the conservation of energy in new developments by initiating a Green Development Award. It is anticipated that a minimum set of standards and principles which would need to be met for developments to be eligible for the award. Annually, submissions would be reviewed by a multi-stakeholder body.	A number of local municipalities within the Region are enacting by-laws to require environmentally sound new development (Energy Star Program for Residential developments and LEED for commercial industrial). The shift in standards to a more environmentally sustainable approach may be more desirable than incentive through awards. Options, including a Green Development Award, will be thoroughly considered by the Planning Department as sustainability initiatives are advanced.

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies

- con't -

New Communities Best Practices

The Best Practices paper is intended to stimulate discussion on the development of the potential New Communities of York Region, and provide a basis for future new community criteria.

The *Best Practices for New Communities Discussion Paper* provides some of the best examples in sustainable community development. There are 42 best practices featured in the paper, which were selected to represent practices that raise the standards on how to build a neighbourhood, and best integrate economy, environment and community in development.

The Best Practices are organized in the following theme areas:

1. Sustainable Community Planning
2. Energy
3. Water Management
4. Green Buildings
5. Creating Livable, Vibrant Communities
6. Sustainable Transportation
7. Green Space
8. Natural Heritage System
9. Sustainable Community Economics
10. Measuring and reporting progress

The best practices will be used to assist in forming the basis for the development of criteria for the new communities (white belt) of York Region.

Many of the best practices take significant steps in moving the Regional sustainability agenda forward. Many of the ideas are beyond the jurisdiction of York Region, and beyond the realm of planning, and require a Regional role in partnerships, advocacy and education.

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies - con't -		
Sustainable Development Through LEED™ (Leadership in Energy and Environmental Design)	An Incentive Program designed to encourage the Development Industry to build high density residential development within our Regional and Local Centres and Corridors and to build those developments in an environmentally sustainable manner or build GREEN buildings.	The Program was launched in March 2008.
York Region Transit: 5 Year Service Plan (2006-2010)	To ensure that the transit system infrastructure supports anticipated transit demand, a 5-Year Service Plan has been developed. By expanding bus routes, number of buses and service hours, transit will be a more attractive option of transportation, leading to increased transit market share and ultimately decreased emissions. Several performance measures used to evaluate the service effectiveness and efficiency including ridership per capita, cost-recovery ratio, and revenue hours per capita.	<p>Since the amalgamation of transit services in 2001, ridership in York Region has grown by over 10 million riders, or an average of 12% per year. By the end of 2007, YRT will have carried over 18 million passenger trips annually, an 8% increase over the previous year. This figure equates to approximately 70,000 passenger trips on an average weekday and amounts to more than a million new trips in just one year. YRT experienced one of the highest growth rates in the GTA and also one of the highest in Canada. *Growth in transit ridership has consistently exceeded annual population growth since the formation of YRT in 2001.</p> <p>This increase in ridership can be attributed to the increased transit service levels along with population and employment growth, a heightened awareness of environmental stewardship, rising fuel prices and extensive marketing activities. Since amalgamation in 2001, the hours of revenue service have increased from approximately 350,000 to over 1,000,000 at the end of 2007. This unprecedented investment in public transit reflects York Region's commitment to the system's expansion and the development of a more balanced and transit supportive transportation network.</p>
Dial-a-Ride Pilot	Use of smaller vehicles: A pilot service being operated in the evenings on Route 44 in Newmarket using taxis instead of larger YRT buses. Customer call for the stop-to-stop service.	Six month pilot (Sept '07 – Mar '08). Possible expansion to other low demand areas where the use of a large conventional type bus is not warranted.
York Region Transit/Viva: Business Benefits Program including RideSaver.	The goal of the Business Benefits program is to increase transit ridership by building business partnerships. Further to encourage businesses and their employees to try transit through a volume discount transit pass program.	This program was launched early 2007 offering bulk monthly transit passes at a discount to local business employees. Transit has successfully partnered with over 20 local businesses and registered 3 businesses in our RideSaver program.

* Canadian Urban Transit Association statistics

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies - con't -		
York Region Transit/Viva Clean Air Promotions and Marketing	Each year YRT/Viva launches a clean air campaign designed to encourage people to try transit. It is promoted through media, contests and rewards for riders.	YRT/Viva staff recognized 5 winners daily riding transit over the one week campaign.
York Region Transit: Web-based information and Call centres	All updated information is available on the website and customers are encouraged to check frequently or to call the Customer Service Centre. In 2007, YRT/Viva launched its trip planner on the website and the automated 24/7 transit schedule information by phone. Theoretically, by making information more readily available to customers, people will also be more willing to take transit. User surveys and monitoring web traffic are used to measure success of the program.	Visits to the website have more than doubled in the past 3 years. Since the launch of our automated information, large volumes of customers are now using this technology, reducing the need for live customer service assistance and paper product schedule and route information.
VIVA Rapid Transit	York Region operates two public transit services, the conventional York Region Transit (YRT) service and the recently launched Viva bus rapid transit service. Combined, these services form a single integrated transit system.	<p>The Viva bus rapid transit service was launched in September 2005 with the deployment of 85 state-of-the-art vehicles, 109 stations, a new terminal in the Town of Richmond Hill, 127 off-board fare vending machines, queue jump lanes, real-time bus arrival information at all stations and a traffic signal priority system. Bus signal priority systems can reduce travel times by up to 6% while they reduce transit delay times by 40%***.</p> <p>The majority of Viva's routes stretch along the main corridors of the Region, on Yonge Street and Highway 7. By displacing 7,000 individual commuter trips per day, VIVA Phase 1 is estimated to avoid over 5,000 t of GHG emissions per year. Future expansion of this project may include dedicated bus lanes, and light rail transit.</p>
VIVA Phase 2	Viva Phase 2 is the second phase of York Region's three-phase rapid transit plan. The Region is embarking on the design and engineering for Viva Phase 2, which involves the construction of approximately 67 kilometres of dedicated "transit-only" lanes called "Rapidways". These Rapidways allow Viva vehicles to cut through congested traffic, significantly reducing travel times for riders.	<p>For Phase 2, Viva has obtained Provincial and Federal funding for:</p> <ul style="list-style-type: none"> • Preliminary Engineering, Intelligent Transportation Systems (ITS) and buses for the following segments: Y2 (Yonge Street - Richmond Hill Centre to 19th); Y3 (Yonge Street - Mulock to Greenlane; Davis Drive; Greenlane); H2 (Hwy 7 from Richmond Hill Centre to Pine Valley); H3 (Hwy 7 from Richmond Hill Centre to Kennedy). • Construction of Y1 bus rapid transit (Yonge Street - Steeles to Richmond Hill Centre) (project under review as part of Move Ontario 2020 Plan analysis of Yonge Subway potential). • Spadina subway extension to the Vaughan Corporate Centre (Highway 7).

*** ITS technology meeting municipal needs - the Toronto experience. 6th world congress conference on ITS; 1999.

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies - con't -		
GTA Smart Card	The proposed Greater Toronto Area Smart Card ("Presto") will provide a common fare card allowing customers to ride on any participating Greater Toronto Area transit systems without pre-purchasing tickets or passes. The customers do not have to worry about the fare policies or have the exact cash fare for each transit system. The smart card will allow fare payment and accommodate the fare policies of all transit systems, including intersystem transfers, discounts and customer loyalty schemes, in a way that will be transparent to the customers. Customers will still be able to pay in cash if they choose. It is likely that the GTA Smart Card system would be in place by mid 2009.	The Smart Card ("Presto") will eliminate the paper based tickets and passes currently used by the customers.
Bike Racks on YRT Transit Buses	Introduction of bike racks on YRT buses is planned on designated YRT routes as a pilot project in 2008. This initiative will further encourage alternative travel modes to the single occupancy vehicle (SOV).	An implementation plan is currently being prepared by staff with an anticipated launch date of Fall 2008.
Great Regional Streets Study	A seven lane cross-section on selected regional routes will allow for high-occupancy vehicle lanes, cycling lanes and pedestrian facilities. Therefore, implementation into the design of a seven lane cross section will encourage different modes of transportation providing the necessary infrastructure.	The recommendation of this study, for the implementation of high-occupancy-vehicle and cycling lanes when widening a four lane road, is now Regional Council policy.
Regional Pedestrian and Cycling Master Plan	The first two phases of this plan investigated policies to encourage and promote cycling within the Region, standards and guidelines on pedestrian/cycling path design, and networks of cycle paths.	The draft Pedestrian and Cycling Master Plan has been completed and has undergone final public and stakeholder consultation. Final adoption of the Master Plan including an implementation strategy was received in April 2008.
Smart Commute Initiative (GTA and Hamilton)	This GTA & Hamilton wide transportation demand management (TDM) project promotes and provides alternative modes of transportation to the single occupancy vehicle and is directly geared towards reducing GHG emission.	Metrolinx has assumed the lead role in furthering the Smart Commute Initiative. York Region will continue to be an integral partner in supporting the transportation management associations operating in York Region as well as supporting Metrolinx in coordinating and providing common TDM services and programs to the GTA & Hamilton region.

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies

- con't -

York Region Smart Commute: Employee Trip Reduction Program	<p>The York Region Smart Commute Initiative reduces barriers to alternative transportation by providing services, discounts, and alternative work arrangements for York Region employees.</p>	<p>Under this program, there are 90 employees registered as using alternative forms of transportation, and 15 registered carpoolers. Total YRT/Viva ticket sales and per employee capital sales have increased every year. The Administrative Centre currently has bike racks (outside and covered), designated carpool parking spots, and showering facilities. To expand the program, similar facilities will be provided at South Services Centre. A 2007 survey provided guidance on other ways to expand the program, according to employee feedback.</p> <p>In June 2007, York Region employees participated in the Commuter Challenge, a week-long event that promotes alternative transportation use. During Canadian Environment Week, 34 employees participated and avoided driving 9,285 kilometres. Assuming that single occupancy vehicles would have been used otherwise, this amounts to an avoidance of 2.3 t GHG.</p>
Arterial Road Reviews	<p>The purpose is to analyze existing traffic signal timings, traffic progression, to mitigate traffic congestion. By improving flow of traffic, there will be less emissions from cars idling at intersections and on the roads, fewer transit delays, and increased transit speed.</p>	<p>Reviews of major roads are completed on a yearly basis.</p>

4. Land Use and Transportation Planning: Achieves Emission Reductions through Transportation and Growth Management Strategies

- con't -

Intelligent Transportation Systems (ITS)

ITS technologies provide staff with a proven, rapidly expanding tool to monitor traffic conditions, manage traffic flow, manage congestion, and ultimately reduce emissions. This technology helps regional staff collect, analyze, and archive data about the performance of the road system. With this data, information can be relayed to travellers through different ITS technologies, improving their ability to make informed travel decisions and avoid traffic which ultimately leads to road congestion and emissions.

Highlights of the systems include "Transit Signal Priority" which changes traffic signal timings automatically to help buses travel through intersections more quickly. "Transit Signal Priority" reacts to the presence of a bus in near proximity to the traffic control signal and provides transit vehicles with a longer "green" time through congested corridors to effectively decrease transit travel times.

Furthermore, "Adaptive Signal Control" changes traffic signal timings automatically to respond to changing traffic conditions. A pilot corridor of Adaptive Signal Control is being implemented along Kennedy Road between Avoca Drive and Clayton Drive.

During the Intelligent Transportation System Strategic Plan process, four main categories were identified based upon projects which the Region could be accountable and facilitate in "managing congestion":

- Traveller Information: providing regional travellers with up-to-date information
- Advanced Traffic Management Systems: improve the efficiency and operation of the existing surface transportation, arterial roads and highways and create safer conditions for travellers
- Transit: York Region Transit is in the process of installing security cameras on buses to monitor traffic conditions during various times of the day and take appropriate measures to address traffic congestion
- Roads Integrated Operation (integrate the Roads Branch operations to provide traffic management functions which support emergency responses)

York Region staff developed this essential Intelligent Transportation System Strategic Plan, following a proven process developed by Transport Canada, and used by Canadian provinces and municipalities. A strategic plan to implement the initiative was proposed and approved by Regional Council in December 2007.

5. Greening Strategies: Carbon Sequestration & Emission Reduction through Energy Conservation

Initiative	Description	Status
Forest Stewardship Council Certification	Forest Certification embodies measurable criteria and indicators for sustainable forest stewardship and can lead to a forest becoming "registered" or "accredited" as complying with recognized standards for sustainable forest management. Certification implies that practices are in place for current and future residents to reap advantages of Regional forests.	The York Region forest is comprised of eighteen tracts of land with a total area of approximately 2031 hectares containing conifer plantations, natural woodlands, wetlands and creeks. In 2000, the York Regional Forest was awarded Forest Stewardship Council certification status, the first public forest in Canada to be so distinguished. In 2005, the Forest was successfully recertified. Ongoing Annual Forest Certification audits are undertaken to ensure good standing by the Region.
Significant Woodlands Study	The purpose of this study is to update the Region's forest cover information using 2002 ortho-photography, and to establish and apply criteria to determine the significance of woodlots within the Region. This information is required to assist with a number of Greening Strategy initiatives relating to the protection and enhancement of a healthy natural heritage system for future generations, including updating the Significant Forest Cover mapping in the Regional Official Plan through a subsequent Official Plan Amendment.	Study completed in 2005 and endorsed by Regional Council in January 2006. Currently being used to direct Greening initiatives and administer the Forest Conservation by-law. Regional Official Plan Amendment addressing the study to be initiated in 2008 (Planning lead) - the study is currently being used to assist with forest preservation on Planning matters with the support of local municipalities.
Constructed Wetlands at Regional Lagoons	Conversion of the lagoons to habitat wetlands will result in the protection of existing habitat values, and the creation of new habitat. The addition of trees and shrubs will also improve local air and water quality.	In 2006, Regional Council approved the conversion of former Regional Sewage Treatment lagoons to habitat wetlands. The lagoons are no longer required for sewage treatment. Lead by the Water and Wastewater Branch, a Design and construction RFP process was undertaken in 2007, Consultant to be awarded by Council in January 2008.
York Region Forest Conservation By-Law	The intent of the Forest Conservation By-Law is to protect the Region's forests by encouraging forest management according to good forestry practices and preventing inappropriate forest clearing. The by-law requires that a permit be obtained before tree cutting is undertaken, which provides an opportunity for increasing the permit applicant's awareness of the importance of forests.	Natural Heritage and Forestry Services section staff continue to successfully utilize the Forest Conservation By-Law (FCBL) to protect forests and promote sustainable management practices. 20-40 permits issued annually.

5. Greening Strategies: Carbon Sequestration & Emission Reduction through Energy Conservation – con't –

Greenlands Property Securement Strategy	The purpose of the Regional Greenlands Property Securement Strategy is to protect conservation lands as part of a healthy natural heritage system for current and future generations. The Regional Securement Criteria put an emphasis on lands that are available for reforestation to enhance existing features, or provide connections within the system. Accordingly, the Greenlands Property Securement Strategy provides opportunities to increase forest cover in the Region and gain the resulting air quality benefits.	The strategy is on-going with over 500 acres secured in the last 2 years and over 1200 acres secured since inception of the program (8 years). Reforestation of secured properties has been a priority. Program demonstrates significant environmental leadership for the Region.
Enhanced Street Tree Planting Program	Trees have the ability to sequester carbon and other air pollutants. Revising the species composition of, and increasing, the urban canopy through street tree planting has the potential to improve ambient air quality. This program has 2 components: <ul style="list-style-type: none"> • Use ability to sequester air pollutants as a criteria when selecting species for street tree planting, and • Investigate opportunity to plant additional trees along narrow Regional Road Rights of Way in partnership with adjacent landowners. 	Street tree planting continues to be a priority. Opportunity to implement: Part a) current street tree species list is being assessed and this information will help inform our decisions. Part b) is being implemented as opportunities arise with ongoing consideration of a more formal program to increase street tree planting through this approach.
Urban Forest Enhancement Program	This program includes subsidizing existing local municipal urban tree planting programs on private property to increase their capacity and providing urban municipalities without programs with the seed money, and annual funds, to establish and maintain them.	In 2005, 2006 and 2007 the Greening Strategy provided support to the Town of Richmond Hill to increase the capacity of their "Healthy Yards" program which provides subsidized native trees and shrubs to landowners. In late 2007, the Greening Strategy initiated a partnership with LEAF (active in Toronto) to investigate the feasibility of implementing a private urban yard tree planting program in York. In support of the feasibility study, a pilot project will be undertaken with LEAF, York Region, and the Town of Markham through 2008.
Afforestation Initiative	In recent years, the use of Conservation Easements (CE) to protect sensitive natural heritage areas from incompatible uses has increased. These easements do not generally include the reforestation of vacant lands.	Working towards York Region's target forest cover of 25%, this project would see active reforestation of secured properties (CE donations) thereby increasing the amount of forest cover in York Region available to sequester carbon and other air pollutants. Through the York Natural Planting Partnership, York Region in partnership with the Conservation Authorities continues to reforest private properties (approximately 50,000 trees and shrubs annually).

5. Greening Strategies: Carbon Sequestration & Emission Reduction through Energy Conservation

Managed Forest Tax Incentive Program	The Managed Forest Tax Incentive Program (Provincial) provides participating landowners with the opportunity to have forested land taxed at 25 % of the municipal tax rate. In order to participate in the program, land owners must have a Forest Management Plan prepared. York Region could, through the Greening Strategy, provide financial assistance to landowners for the preparation of this plan in order to increase participation in the Managed Forest Tax Incentive Program (MFTIP) in York Region.	No action taken to date. Need to assess potential uptake and impact to Regional tax revenues. Opportunities may be further considered in 2008.
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6. Community Education & Awareness Strategies: Achieves Emission Reductions through Behaviour Change

Initiative	Description	Status
20/20 The Way to Clean Air Campaign	<i>20/20 The Way to Clean Air</i> is a social marketing outreach campaign, coordinated by the Clean Air Partnership and delivered by public health units across the GTA. The program benefits from the support of non-government agencies and schools. The 20/20 program enables people to reduce home and transportation energy use by 20% through the use of social marketing tools and incentives.	<i>20/20 The Way to Clean Air</i> reached approximately 12,000 GTA households in 2006. The 20/20 evaluation has demonstrated that the program is very effective at helping people implement energy conservation actions at home and on the road. Based on respondents' self-reported activities, on average, participants achieved a 25% reduction in home energy use and 1.5 tonnes of emissions reductions per household; 19% of vehicle kilometres travelled and 1.1 tonnes of emissions were reduced. One of the most effective outreach mechanisms employed is the delivery of 20/20 through schools. The 20/20 Planner was re-designed to fit into the family of Ecoschool guides. From 2004 to 2007, 40 schools, 216 classrooms and 5866 students participated in the 20/20 program in York Region.
Active and Safe Routes to School	York Region's Active & Safe Routes to School Committee works collaboratively to increase local participation in this province-wide program. Developed by Green Communities Canada, the goals of the program are to improve air quality, create safer neighbourhood routes for children, increase physical activity levels and foster community spirit.	All York Region elementary and high schools are sent resource packages (and offered telephone consultation) to promote participation in: - IWALK - International Walk to School during the month of October. - Spring into Spring - Schools challenged to take the Earth Day to Clean Air Day Challenge. Initiatives promote clean air, safe routes to school, and activities that aim to increase physical activity. Schools participating in the York Region Healthy Schools Program (60 in 2007/08) that focus on a physical activity and/or environmental health action plan receive additional resources and consultation from the Community and Health Services Department.

6. Community Education & Awareness Strategies: Achieves Emission Reductions through Behaviour Change – con't –

Smog Alert Response Activities	<p>The Ontario Ministry of the Environment (MOE) has established a network of 40 continuous air monitoring stations throughout Ontario that commonly monitor NO_x, SO₂, O₃, PM_{2.5}, and CO. Some monitor total reduced sulphur compounds and/or VOCs.</p> <p>Measurements of pollutants at these stations are used to determine air quality trends, develop the Air Quality Index^{†††} (AQI) and to warn the public of poor air quality events (smog alerts).</p> <p>Examples of regional activities that could be initiated to reduce energy use (over and above daily conservation activities) include:</p> <ul style="list-style-type: none"> • reduce staff vehicle trips by promoting alternative modes of commuting, and working including the use of teleconferences and video conferencing, flexible work schedules, and limiting unnecessary travel • step up energy conservation actions in regional offices • notifying Regional fleet operators and recommend suspending non-essential use of regional motor vehicles, deferring non-essential deliveries and errands, and encourage refuelling after sundown or before sunrise 	<p>Smog alert response actions include internal and periodic public notification. This involves internally notifying all regional employees of the smog alert event through York Beat, as well as disseminating relevant smog-related information to initiate department specific policies and employee actions to reduce emissions. Some departments encourage the region's contractors to register with the MOE's Smog Alert Network and to include this stipulation in the Tender/RFP contracts (e.g. provisions in summer grounds maintenance tenders to cease grass cutting on smog days).</p> <p>The public notification aspect focuses on providing information for the York Region Health Connection line and to the York Region website, issuing public service announcements (as appropriate) to inform the public of smog advisories and extreme heat events and to promote actions to reduce emissions. It also includes responding to media requests, promotion of the 20/20 The Way to Clean Air Program and the York Region Smog Alert Brochure, and responding to air quality complaints.</p>
Housing York Inc. Tenant Education	<p>This education and awareness program in the 30 HYI housing communities promotes the need for energy and emissions reductions. This is done through brochures, newsletters, bulletin board postings and discussion during resident meetings on methods that can be employed by residents to assist HYI in achieving these goals.</p>	<p>Increased tenant awareness of energy and environmental issues has been a key component of the HYI energy management program over the last two years. Each tenant newsletter contains an article on energy and/or environmental issues and each building has a bulletin board that is regularly updated with similar information. At least once a year, brochures supplied by local utilities or other government agencies are distributed to each tenant.</p>

††† In 2007 Environment Canada piloted the new Air Quality Health Index (AQHI) in the City of Toronto. The AQHI is a new national public information tool that measures the combined health risk associated with local air pollution levels. The system will enable people to better protect themselves, and people in their care, from harmful effects of air pollution. The AQHI pilot will impact on the Smog Alert Program as it is expected that health risk may be reported as high on days when the AQI registers moderate air quality. It is expected that the AQHI pilot will be expanded to include York Region and across the GTA in 2008.

6. Community Education & Awareness Strategies: Achieves Emission Reductions through Behaviour Change– con't –

Solid Waste	The Region is responsible for waste, compost and recycling processing while the local area municipalities are responsible for picking up the materials from residents and businesses. These activities require energy for transportation and facility utility consumption. The Region's efforts in promoting and supporting improved waste management through blue box programs and reusable goods collection aids indirectly in reducing emissions. Also, decomposition of landfill waste leads to methane emissions. The global warming potential of this greenhouse gas is 21 times the impact of carbon dioxide.	Currently, 63% of York Region post diversion solid waste is delivered to landfills in Michigan, which contributes to emissions through waste decomposition and vehicle fuel combustion. Soon 57% of the Region's post diversion waste will soon be processed within York Region to manufacture fuel pellets. This new arrangement, and the York-Durham thermal processing facility for residual waste reduces the vehicle kilometres travelled.
Expanding Blue Box Program and Source Separated Organics	By increasing waste diversion through expansion of the Blue Box Program and Source Separated Organics (SSO), methane generated at landfills from decomposition of organic matter will be reduced and transportation to Canadian composting and recycling processing facilities may lead to fewer vehicle emissions by reducing kilometres travelled.	York Region's efforts in waste diversion have been recognized by the Recycling Council of Ontario. In the Waste Diversion Program Operator category, a Bronze Medal was garnered by the new Waste Management Centre. It was opened in July 2005 and includes a single-stream recycling facility, garbage transfer station, food waste transfer station and education centre. The Yes! Blue Box Campaign, launched in fall 2005, utilised advertisements and brochures to educate residents on new items being accepted in blue boxes and on the fate of recycled items. This program received a Gold Medal in the Promotion category. As of September 2007, household collection of SSO was available in all nine local municipalities. The Region is targetting 65% waste diversion for 2010.
Waste – Recycling Containers at Transit Facilities (stops and terminals)	YRT has introduced recycling containers at transit stops and terminals. This project was at no cost to the Region as the contractor provides the container and conducts the recycling / waste pick up in lieu of advertising rights on the units.	Approximately 400 recycling units have been installed to date since the installation commenced in 2006.

APPENDIX B – EMISSIONS CALCULATIONS AND EMISSIONS FACTORS

Table 1: 2004 Inventory of Greenhouse Gases and Criteria Air Contaminants ‡‡‡, §§§, ****

	CO2	CH4	N2O	CO	NOx	SOx	PM10	PM2.5	VOC
Electricity									
[kg]									
Buildings	7771284			3273	11655	33435	1665	682	111
Water and Wastewater	14625509			6161	21934	62924	3133	1283	209
Street/Traffic Lights	1726922			727	2590	7430	370	152	25
Total	24123715			10200	36200	104000	5170	2120	346
Natural Gas									
[kg]									
Total	5543907	108	97	3940	4691	28		356	258
Fleets									
[kg]									
Transportation and Works	1326307	146	106	22442	5054	118	130	96	1275
Emergency Medical Services	1181900	63	76	4791	6059	217	202	167	520
York Region Transit	16352173	779	479	33037	129639	3182	5327	4826	4251
York Regional Police	5704739								
Total	24565119	988	661	60271	140753	3517	5659	5089	6045
Region total									
[kg]									
Total	54232742	1096	758	74411	181643	107545	10829	7565	6649
eCO2	Total	54490647							

Emission factors:

When NOx and SOx emissions are reported, they must be expressed with respect to one of the compounds, i.e. 1 tonne NOx as NO. To express NOx in terms of NO₂, one must use the molecular weight, as shown below. All NOx and SOx have been reported in terms of NO₂ and SO₂.

1 t NOx (as NO) x 46 g NO₂/30 g NO = 1.53 t NOx (as NO₂)

‡‡‡ Corporate Greenhouse Gas Inventory & Local Action Plan. International Council for Local Environmental Initiatives for York Region. November 17, 2004.

§§§ Urban Transportation Emissions Calculator [Internet]; c2008 [cited 2008 20/02]. Available from: <http://www.tc.gc.ca/UTEC/>.

**** Paper Calculator [Internet]; c2007 [cited 2008 02/02]. Available from: <http://www.environmentaldefense.org/papercalculator/>

Table 2: Electricity, natural gas, on-road gasoline fuel fleet emission factors

	CO2	CH4	N2O	CO	NOx	SOx	PM10	PM2.5	VOC
Electricity									
[kg/kWh-net]									
	0.258			0.00010867	0.000387	0.00111	0.0000552	0.0000226	3.69E-06
Source	Ontario Power Generation Sustainable Development Report 2004 ^{†††}								
Natural Gas									
[kg/m ³]									
	1.891	0.000037	0.000033	0.00134	0.0016	0.0000096		0.000121 ¹	0.000088
Source	Canada's Greenhouse Gas Inventory 1990 -2003 ^{†††}			AP - 42, 5th Ed.					
Fleet									
On-road fleet- Gasoline fuel									
	[kg/L]			[g/km]					
LDGV	2.36	0.00012	0.00026	8.287	0.502	0.007	0.016	0.0073	0.471
LDGT1	2.36	0.00022	0.00041	10.674	0.576	0.009	0.016	0.0077	0.553
LDGT2	2.36	0.00022	0.00041	8.214	0.544	0.009	0.016	0.0076	0.344
LDGT3	2.36	0.00022	0.00041	11.176	0.700	0.012	0.020	0.0100	0.572
LDGT4	2.36	0.00022	0.00041	9.814	0.809	0.012	0.019	0.0093	0.496
HDGV2B	2.36	0.00017	0.001	4.636	2.091	0.017	0.049	0.0370	0.257
HDGV3	2.36	0.00017	0.001	12.323	3.378	0.019	0.059	0.0421	0.807
HDGV4	2.36	0.00017	0.001	7.333	2.811	0.019	0.052	0.0355	0.588
HDGV5	2.36	0.00017	0.001	9.863	3.645	0.022	0.053	0.0356	0.783
HDGV6	2.36	0.00017	0.001	9.918	3.135	0.022	0.052	0.0358	0.553
HDGV7	2.36	0.00017	0.001	24.146	4.289	0.024	0.063	0.0427	1.359
HDGV8A	2.36	0.00017	0.001	12.654	3.780	0.025	0.069	0.0409	0.838
HDGV8B	2.36	0.00017	0.001	18.586	5.198	0.027	0.071	0.0426	1.221
Source	Canada's Greenhouse Gas Inventory 1990 -2003			Environment Canada					

†††† Sustainable Development Report: 2004 [Internet]; c2004 [cited 2007 06/08]. Available from: <http://www.opg.com/news/reports/?path=Sustainable%20Development%20Reports>.

††††† Canada's Greenhouse Gas Inventory: 1990-2003 [Internet]; c2008 [cited 2008 02/02]. Available from: http://www.ec.gc.ca/pdb/ghg/inventory_report/2003_report/ann13_e.cfm#sa13_1_1.

Table 3: On-road and off-road diesel fleet emission factors

	CO2	CH4	N2O	CO	N0x	S0x	PM10	PM2.5	VOC
Fleet									
On-road fleet- Diesel fuel									
	[kg/L]			[g/km]					
LDDV	2.73	0.00005	0.0002	0.684	0.552	0.041	0.0799	0.0665	0.1659
LDDT1	2.73	0.00007	0.0002	0.512	0.553	0.059	0.0931	0.0786	0.2407
LDDT2	2.73	0.00007	0.0002	0.565	0.544	0.009	0.1050	0.0897	0.2680
LDDT3	2.73	0.00007	0.0002	0.668	0.882	0.077	0.1007	0.0858	0.3606
LDDT4	2.73	0.00007	0.0002	0.729	0.809	0.012	0.1140	0.0980	0.3620
HDDV2B	2.73	0.00012	0.00008	0.606	2.611	0.101	0.0890	0.0753	0.1278
HDDV3	2.73	0.00012	0.00008	0.717	3.226	0.112	0.0994	0.0832	0.1604
HDDV4	2.73	0.00012	0.00008	0.909	3.824	0.128	0.1037	0.0873	0.1952
HDDV5	2.73	0.00012	0.00008	0.864	3.624	0.131	0.0833	0.0685	0.1799
HDDV6	2.73	0.00012	0.00008	0.918	5.042	0.149	0.1459	0.1262	0.2561
HDDV7	2.73	0.00012	0.00008	1.240	6.761	0.172	0.1678	0.1465	0.3415
HDDV8A	2.73	0.00012	0.00008	1.639	10.804	0.198	0.2209	0.1855	0.3044
HDDV8B	2.73	0.00012	0.00008	1.796	11.240	0.208	0.2145	0.1797	0.3257
Source	Canada's Greenhouse Gas Inventory 1990 -2003			Environment Canada					
	[kg/km]								
URB BUS	2.73	0.00013	0.00008	3.158	12.393	0.304	0.509	0.461	0.406
	Canada's Greenhouse Gas Inventory 1990 -2003			Environment Canada					
Off-road fleet- Gasoline fuel									
	[kg/L]								
	2.36	0.0013	0.00006						
Off-road fleet- Diesel fuel									
	[kg/L]								
	2.73	0.00014	0.0011						
Source	Canada's Greenhouse Gas Inventory 1990 - 2003								



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