City of Hamilton

Development of Policy Papers for Phase Two of the Transportation Master Plan for the City of Hamilton

TRANSPORTATION ENERGY USE AND GREENHOUSE GAS EMISSIONS POLICY PAPER

FINAL REPORT
JANUARY 2005
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1. INTRODUCTION

1.1 Study Background and Objectives

The City of Hamilton City-wide Transportation Master Plan will provide inputs to the Growth Related Integrated Development Strategy (GRIDS) and make recommendations to Council on the adoption of a City-wide Transportation Policy that is cognisant of Vision 2020 and other City of Hamilton long-term planning objectives. The project has been divided into three distinct phases. The first phase consisted of the technical calibration of the existing transportation model to reflect current transportation conditions in Hamilton. The second phase, which is the object of this and other policy papers, will focus on the development of 23 policy papers in the following areas: Travel Demand, Urban Development, System Performance, Infrastructure Planning and Infrastructure Financing. Following the completion of the Policy Papers, the City will proceed to develop transportation scenarios (Phase 3 of the project) based upon the results of the policy work performed in Phase 2 and the land use scenarios developed through the broader GRIDS study and will test the efficiency and viability of these scenarios by integrating them into the calibrated model.

This policy paper addresses the issue of Transportation Energy Use and Greenhouse Gas Emissions (GHGs) in the City of Hamilton. The issues of general air quality and smog are addressed in a separate policy paper on Air Quality. The remainder of this section describes and quantifies the relationship between transportation energy use and the release of greenhouse gases. Section 2 reviews current policies that impact GHG emissions. Section 3 describes the levels of energy use and GHG emissions in the City of Hamilton, as well as the future outlook for the supply and demand of transportation energy and GHG production for Hamilton under a trends scenario. Section 4 reviews emissions reduction practices from other jurisdictions. Section 5 outlines policy options for moderating or reducing energy consumption and GHG emissions from. Section 6 provides succinct recommendations for policies to reduce GHG emissions. Section 7 evaluates the policy recommendations.

1.2 Energy Use and Greenhouse Gas Emissions

While the reasons for discussing energy use vs. greenhouse gas emissions are distinctly different, the two issues are closely linked. Within the transportation sector, greenhouse gas emissions are a direct product of the burning of fossil fuels. For Carbon Dioxide (CO₂) emissions, the main contributor to greenhouse gas emissions, the ratio is virtually one-to-one. Every litre of fuel that is burnt produces an exact mass of CO₂ emissions. As a result, CO₂ emissions can only be lowered by reducing fuel consumption and are not impacted by emissions control technologies. Other components of GHG emissions, namely methane, nitrous oxide are somewhat influenced by technologies, but represent less than 20% of GHG emissions.

The issue of energy use for transportation is an important one from two different perspectives. Firstly, energy conservation is a goal of sustainable transportation where there is a recognized need that individuals and societies should not consume resources beyond the rate at which they can be renewed or will not be available for future generations. A related issue, and one that assumes society will continue on the trend of consuming energy faster than it can be renewed, is the issue of energy prices. As discussed within this report, energy prices are expected to increase significantly within the time horizon of this master plan (20 years) and therefore the City must develop a plan that is responsive to these potential price increases.

The issue of climate change is perhaps even more important than energy conservation because of its potential effect on global ecosystems and human activities. Although climate change is often
thought of as a global issue, it is an issue that must be taken seriously at the local level in order to prepare for consequences such as heat waves, summer and winter storms, droughts and floods. Climate change can also have an impact on air quality, which worsens in warmer weather, spread of infectious diseases and even physical and mental stress.

1.3 Greenhouse Gas Emissions and Climate Change

Low levels of naturally occurring greenhouse gases in the atmosphere retain the sun’s heat energy, warming the climate and regulating the temperature to within limits that make life possible. The Earth naturally absorbs about 30% of the sun's energy. The remaining 70% is reflected back into space. Since the Industrial Revolution began, human activity, especially the burning of fossil fuels to provide energy, has resulted in the rapid release of large amounts of GHGs including carbon dioxide, methane, nitrous oxide and ozone. These gases also trap solar energy in the atmosphere. Over the last 200 years, atmospheric concentrations of both types of gases have increased dramatically.

Pre-historic and geological records show that the Earth’s climate has changed many times over millennia and that temperatures have risen and fallen naturally. However, there is broad scientific consensus that the unprecedented increase in GHGs from human activities is causing the atmosphere to retain more energy and will cause rapid changes in climate. Most telling is the fact that “the 10 warmest years worldwide, since records began nearly 140 years ago, have all occurred since 1980.”

Climate change and global warming do not mean longer summers or milder winters. Global warming leads to other types of climate change including:

- An increase in the occurrence of extremely hot days, and a decrease in the occurrence of extremely cold days.
- More severe droughts and/or floods in some locations in Canada.
- More intensive and violent summer storms and winter storms.
- Increases in frost heave, thaw settlement and slope instability associated with permafrost melting in the North, which could damage structures including airports, roads, railways, buildings, waste dumps, water diversion channels, utility lines and pipelines.
- Impacts on lifestyles in the North due to possible changes in the availability and distribution of wildlife and related food resources.
- Longer and warmer frost-free periods across Canada which may improve conditions for commercial agriculture, if the soil moisture is sufficient.
- Increases in sustainable marine fish harvests for most of the Arctic, and for northern freshwater fish, while there may be general decreases for Pacific (e.g., southern salmon, cod), and Atlantic marine and southern freshwater fish (e.g., trout, whitefish, grayling).

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1 See Vision 2020 Sustainability Indicators Report, 2002 for further elaboration of these impacts

2 Environment Canada, Tracking Key Environmental Indicators, 2001
• Forests are expected to shift northward in Canada due to climate change, but may experience increased drought stress, an increase in frequency and severity of fire, more frequent and severe storm and wind damage, especially in coastal regions\textsuperscript{3}.

The threats of global warming and climate change have become priorities around the world for a number of stakeholders including politicians, economists and insurance companies. The threats of climate changes are being taken seriously by governments because of the potential to cause social unrest in counties most impacted by changing weather patterns.

It is worth noting that global warming and climate change are often mistakenly associated with local air quality problems such as smog. While transportation emissions contribute to both GHG and smog, these problems have different impacts on the environment. GHGs contribute to climate change, while other pollutants such as volatile organic compounds, nitrogen oxides, carbon monoxide and particulate matter cause smog and related health impacts. Climate change is also a global rather than local phenomenon. The distinction is important because methods used to reduce one type of pollutant may not reduce the other, and there is potential to reduce both smog and GHG emissions with combined policy initiatives.

\textsuperscript{3} Environment Canada, Canada Country Study Climate Impacts and Adaptation – National Summary for Policy Makers, 1997.
1.4 Transportation Energy Use and Greenhouse Gas Emissions

1.4.1 TRANSPORTATION’S SHARE OF TOTAL ENERGY USE

The transportation sector, which moves passengers as well as freight, is a major energy consumer and producer of GHGs both globally and in Hamilton. As seen in Exhibit 1.1, 29% of all the energy used in Canada in 2001 went to transportation. Presently, the transportation sector is almost totally dependent on fossil fuel, particularly oil based petroleum products such as gasoline and diesel fuel.

Exhibit 1.1: Energy Use By Sector, 2001

![Energy Use By Sector, 2001](image)


Between 1990 and 2001, increases in Canadian transportation energy consumption (21.3%) outpaced increases in over all energy consumption (13.8)\(^4\). The rate of increase for transportation-energy consumption far exceeded increases in all other sector except commercial/institutional.

1.4.2 TRANSPORTATION’S SHARE OF TOTAL GHG EMISSIONS

Because of its large energy needs and dependence on fossil fuel, transportation is one of the largest sources of GHG emissions. Exhibit 1.2 shows transportation’s contribution to total GHG emissions. In 2001, transportation produced 34% of all GHG emissions in Canada. Over the last decade, GHG emissions increased in parallel with fuel consumption. This increase was driven by population growth and increasing fuel consumption by individuals. GHG emission from transportation increased by 20.7% while total GHG emissions from all sources increased by only 16.1\(^5\).


1.4.3 TRANSPORTATION ENERGY USE AND GHG EMISSIONS BY MODE

As depicted in Exhibit 1.3 the transportation sector is divided into passenger, freight and off-road activity. Passenger energy consumed 58% of total transportation energy; freight consumed 39%, while off-road transportation used only 4% of total transportation energy.

Not surprisingly, personal cars and trucks were the single largest source of energy use for passenger transport. Trucks used 30% of total energy and more than half of the energy used to move freight.

Exhibit 1.4 shows the trends in GHG emissions within the transportation sector. Passenger transportation increased 8.3% between 1990 and 2001 and freight emissions increased 41.8%. While emissions from off-road sources grew the fastest, they accounted for only 4% of transportation emissions in 2001. GHG emissions from freight-hauling trucks grew faster than any other mode - ranging from 50% for heavy trucks up to 80% for light trucks. Overall, emissions from all transportation increased by approximately 20% between 1991 and 2001.

GHG trends over the last 10 years are in the opposite direction of the now ratified Kyoto protocol, which envisions a reduction of 6% from 1990 levels by 2012 (see Section 2.1 for discussion of Kyoto targets).
Exhibit 1.3: Energy Use by Mode, 2001

Exhibit 1.4: Total GHG Emissions by Transportation Mode in Canada
    (in million tonnes CO2 equivalent)

<table>
<thead>
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<tbody>
<tr>
<td>Passenger Transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cars and Light Trucks</td>
<td>67.7</td>
<td>68.5</td>
<td>72.8</td>
<td>78.2%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Urban and Inter-city Bus and Rail</td>
<td>4.7</td>
<td>5.0</td>
<td>4.7</td>
<td>5.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Air</td>
<td>13.6</td>
<td>13.5</td>
<td>15.4</td>
<td>16.5%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Passenger Transportation GHG Emissions</td>
<td>86.0</td>
<td>87.0</td>
<td>93.1</td>
<td>57.1%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Freight Transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light Trucks</td>
<td>6.7</td>
<td>9.1</td>
<td>12.0</td>
<td>18.7%</td>
<td>79.1%</td>
</tr>
<tr>
<td>Medium Trucks</td>
<td>7.5</td>
<td>8.9</td>
<td>11.8</td>
<td>18.4%</td>
<td>57.3%</td>
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<tr>
<td>Heavy Trucks</td>
<td>16.1</td>
<td>20.6</td>
<td>24.6</td>
<td>38.4%</td>
<td>52.8%</td>
</tr>
<tr>
<td>Rail</td>
<td>6.7</td>
<td>6.2</td>
<td>6.3</td>
<td>9.8%</td>
<td>-6.0%</td>
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<td>Marine</td>
<td>8.1</td>
<td>7.8</td>
<td>9.3</td>
<td>14.5%</td>
<td>14.8%</td>
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<tr>
<td>Freight Transportation GHG Emissions</td>
<td>45.2</td>
<td>52.6</td>
<td>64.1</td>
<td>39.3%</td>
<td>41.8%</td>
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<tr>
<td>Off-Road GHG Emissions</td>
<td>3.8</td>
<td>4.5</td>
<td>5.8</td>
<td>3.6%</td>
<td>52.6%</td>
</tr>
<tr>
<td>All Transportation</td>
<td>135.0</td>
<td>144.1</td>
<td>163.0</td>
<td>100%</td>
<td>20.7%</td>
</tr>
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2. CURRENT POLICY SITUATION

2.1 Federal Government

The Canadian government establishes national policies related to energy and GHG emissions, regulates and taxes the transportation sector, provides funding and services, and makes information available to the transportation sector and private citizens about the impacts of GHGs and ways to reduce emissions. The federal government is responsible for a number of initiatives and policies relating to GHG emissions through the departments of Environment Canada, Natural Resources Canada and Transport Canada. Canada’s Action Plan 2000 pledged $625 million to the goal of reducing GHG emissions by 65 megatonnes annually by the 2008 – 2012 period.

The Canadian government signed the international Kyoto Protocol in 1997. The Protocol voluntarily commits countries to reduce their GHG emission to 6% below 1990 levels by 2012, and sets specific national goals for reducing GHG emissions. Some programs to promote energy efficiency and reduce emissions in some sectors of the economy have shown promising results. Projections show that Canada may not meet its Kyoto goals for GHG reduction by 2010. Rather than beginning to decline, Canada’s total GHG emissions continue to increase. Current projections estimate that Canada will be 26% higher than its Kyoto goal. Efforts aimed at reducing GHG emissions for transportation have been overwhelmed by increased automobile use and dependence on fossil fuel.

2.2 Provincial Government

Provincial governments also play an important role in managing energy use and GHG emissions. The provinces, including Ontario, regulate and tax the transportation sector, and provide funding and service that impact energy use and GHG emissions. Ontario operates GO Transit and provides educational information on GHG reduction. The Ontario provincial government is responsible for a number of policies and initiatives that impact GHG emissions, including decisions on land use as well as major infrastructure investments and highway construction.

In 2001, the Ministry of Transportation commissioned a study to assess and identify transportation Greenhouse Gas reduction measures that could be implemented in the near term in Ontario to assist the Province in analysing issues, concerns and options being considered for the Kyoto Protocol, the National Implementation Strategy and Ontario’s specific climate change issues. Most of the recommendations were dependent on actions at the municipal level and primarily municipal transit agencies. The degree to which these recommendations were implemented is uncertain, although certainly projects such as the York Rapid Transit System Quick Start Program, which is being funded in part by the province, is consistent with the intent of the Near Term Options study.

2.3 Review of Existing City of Hamilton Policies & Initiatives

The City of Hamilton has a strong framework of existing authority, policies and initiatives that support the reduction of GHGs. The City’s Vision 2020 document provides strong direction for the establishment of GHG-related policies in the City of Hamilton. One explicit goal set forth in Vision 2020 is to reduce GHG emissions to 20% below 1990 levels. Of all the levels of government, the City of Hamilton has the most influence over urban transportation energy use and GHG emissions.

- The City government sets local policies and zoning laws that, along with real estate markets, determine the shape of land use which in turn influences the GHG’s emitted for travel;

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• The City can set local policies that affect car use and influence personal decisions of how to travel, for example parking supply and pricing;

• The City can influence the effectiveness of the alternatives to car use such as transit, walking and biking. The City already provides transit service and has been moving toward improving options for non-motorized travel such as bike lanes, trails and pedestrian safety; and,

• The City works with other local governments and agencies in the region to coordinate transportation services and policies.

In 1995, the City of Hamilton joined the Partners for Climate Protection (PCP). This international network of municipalities helps local governments increase public and political awareness of key environmental issues, provides technical assistance and training, and evaluates local and cumulative progress toward sustainable development. PCP has established guidelines to help municipalities reduce their GHG emissions. By joining PCP, the City committed implement a local action plan with the following goals:

• Reduce greenhouse gas emissions from municipal operations by 20 percent of 1994 levels; and

• Reduce community wide emissions by six percent of 1994 levels.

These goals were to be met within 10 years of joining the PCP program; however, it is unlikely that this will happen based on actual emission estimates as presented in Section 3.1. However, several actions have been taken to help move towards achieving the targets including:

• Replacement of diesel buses with natural gas powered vehicles

• Purchase of gas-electric hybrid vehicles for City fleet (10 vehicles were purchased in 2002)

• Construction of the Hamilton Community Energy Centre, which provides co-generated heat and electricity to several buildings in the downtown core, including City Hall

The City of Hamilton is also involved with a number of local groups concerned with local air quality including Clean Air Hamilton, Green Venture, Environment Hamilton, and Southern Ontario Clean Airshed Network Initiative. More information on these groups is available in the policy paper on Air Quality.
3. SUPPORTING INFORMATION AND ANALYSIS

The following information illustrates the characteristics of energy use and GHG emissions for the transportation sector in the City of Hamilton as well as global energy-supply trends that will influence fuel prices, and energy consumption in Hamilton in the future.

3.1 Existing GHG Inventories

In 1999, the City of Hamilton completed inventories to determine greenhouse gas emissions from municipal operations and city-wide activities. Emissions were determined for the baseline year of 1994 and for 1998. The results are shown in the following table taken from the Annual Sustainability Indicators Report (2002) for the City.

<table>
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<tr>
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<th>1994 eCO₂ (Tonnes)</th>
<th>1998 eCO₂ (Tonnes)</th>
<th>Trend to 2005</th>
<th>Goal</th>
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<tr>
<td>Municipal Operations</td>
<td>18,503</td>
<td>17,800</td>
<td>16,569 (3.8% reduction)</td>
<td>14,802 (20% reduction)</td>
</tr>
<tr>
<td>City-wide Emissions</td>
<td>6,259,628</td>
<td>6,599,162</td>
<td>7,697,280 (22.9% increase)</td>
<td>5,884,050 (6% reduction)</td>
</tr>
</tbody>
</table>

Note: eCO₂ is a measure of all Green House Gases, such as nitrous oxide and methane, adjusted to equivalent CO₂ units.

Source: Annual Sustainability Indicators Report, December 2003.

The inventories presented in the above table are based on a number of assumptions and it is noted that the City has, and continues to refine its GHG inventories. Improved data collection to support the estimation of GHG emissions from transportation and other sources is recognized as a key priority.

3.2 Fuel Use Trends in Hamilton

Fuel use is an important indicator of the efficiency of the transportation system. Increased use of fuel per person generally indicates a decline in efficiency. Exhibit 3.2 depicts the trends in gasoline fuel sales (an indicator of fuel use by passenger transportation) in Hamilton during the last decade. As shown, total gasoline sales increased by over 20% between 1991 and 2001. While increased energy use is natural in areas with growing populations, fuel sales in Hamilton actually increased faster than the population meaning that on a per person basis people were using more fuel. Between 1991 and 2001 energy use per capita in Hamilton increased by 15%.

Increased fuel consumption translates directly into increased levels of GHG emissions. If current trends continue, Hamilton’s production of GHG emissions can be expected to continue over the foreseeable future. This stands in contrast to Hamilton’s Vision 2020 goal of reducing GHG emissions to 20% below 1990 levels.
3.3 Hamilton in Comparison

Exhibit 3.3 illustrates Hamilton's fuel use compared with other cities. While fuel use increased across Canada during the 1990s, Hamilton's per capita fuel use increased more rapidly than most, from almost 1,100 litres per capita to nearly 1,250 litres. By 2001, Hamilton was using more fuel per capita than all of those cities selected for comparison except Oshawa.

Fuel use in Hamilton and Oshawa is higher than similar sized cities, in part, because many residents commute to and from the GTA. These longer driving distances use more fuel and produce more GHGs. High fuel use in Hamilton is also connected to the low levels of transit use; only 7% of daily trips use transit.
Exhibit 3.3: Fuel Use Trends for Selected Canadian Cities


3.4 Future Outlooks for Energy Use and GHG Emissions

Overall demand for fuel is determined by two factors:

- Total distance of travel by Hamilton residents; and,
- Average fuel efficiency of the vehicle fleet.

These two factors were examined for Hamilton in order to estimate trends in the demand for fuel under a business-as-usual scenario with no significant changes to transportation policies or traveler behaviour. Because there is limited data on freight fuel consumption, the analysis was restricted to passenger travel.

In 2001, Hamilton residents generated approximately 4.8 million kilometres of travel on a typical weekday. At an average fuel efficiency of 11 litres per 100 km, this translates into approximately 532,000 litres of gasoline per day, or 194 million litres per year.

As shown in Exhibit 3.4, Natural Resources Canada predicts that average car and light truck fuel efficiency will improve by 11% between 2000 and 2020. This assumes that the popularity of light trucks, vans and SUVs will continue, essentially negating much of the technological improvements that have and will be made in the small car sector.

Under a business as usual trend, it is projected that total vehicle-kilometres of travel by Hamilton residents will increase by approximately 15% assuming no significant changes in average trip distances. Accounting for improvements in fuel efficiency, the total increase in fuel will be about 2%
over the next 20 years. This estimate is probably conservative since it is based on a fairly modest population growth. Nevertheless, the fact that fuel use is projected to increase is counter to the Vision 2020 goal of reducing GHG’s from transportation. It is also in the opposite direction required to achieve the Kyoto protocol.

### Exhibit 3.4: Fuel Efficiency by Mode (Litres/100 km)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2020</th>
<th>% Improvement</th>
</tr>
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<tbody>
<tr>
<td>Car Fleet Fuel Efficiency</td>
<td>9.9</td>
<td>8.4</td>
<td>-15%</td>
</tr>
<tr>
<td>Gasoline Truck Fuel Efficiency</td>
<td>13.3</td>
<td>12.0</td>
<td>-10%</td>
</tr>
<tr>
<td>Average Efficiency</td>
<td>11.0</td>
<td>9.8</td>
<td>-11%</td>
</tr>
</tbody>
</table>

Source: Natural Resources Canada. *Canada’s Energy Outlook, An Update, 1999*

### 3.4.1 IMPACT OF TECHNOLOGIES

The above forecasts represent a conservative prediction of improvements in fuel technology. There are, however, a number of technologies current available or under development that could further improve fuel efficiency and/or reduce GHG emissions including:

- Hybrid vehicles;
- Electric Vehicles;
- Alternative fuel vehicles (e.g. natural gas, ethanol);
- Fuel cell vehicles.

Although it is difficult for municipalities to influence personal vehicle choices, they can lead by example by adopting new technologies for municipal fleets that are proven to reduce GHG emission and energy use.

### 3.5 Future Outlooks for Energy Supply

Because the global demand for oil will continue to rise, it is important to understand future trends in oil supplies and their potential to increase gasoline prices. Despite advances in alternative energy sources for transportation, such ethanol from plants and hydrogen from hydro-electricity, oil will continue to be the mainstay of transportation energy for the foreseeable future. While technologies such as fuel cells and hybrid vehicles are starting to come into the market, their impacts will not be felt for many years or decades because of the length of time it takes to replace the vehicle fleet. Therefore, it is prudent to at least plan for a transportation system that continues to rely on oil as the primary source of energy, so as to identify alternative travel options should constraints on oil become an issue.

Since the 1920s the cost of motor fuel has remained low because the supply of easily extracted oil has been unconstrained and could easily meet the growing demand. However, the future outlook for fuel supply is a widely debated topic. Most projections suggest that most of the easily extracted deposits of oil have been found and in the near future the cost of transportation fuel will begin increase due to the increased cost of oil extraction, fuel production, and rapidly increasing global
Some estimates see a steep decline in conventional oil supply as seen in Exhibit 3.5. Combined with significantly increased demand, mainly fuelled by growing transportation in areas such as Asia, a dramatic increase in fuel costs beginning before 2015 is very likely. The increasing costs of oil and energy will affect most parts of life in Canada with the most energy intensive sectors of the economy, including transportation, being most affected. Hamilton’s reliance on automobile travel and fossil fuels is higher than many of its peers and increased gasoline costs would have significant implications for Hamilton’s economy and quality of life. In light of anticipated increases in fuel costs, it makes sense for Hamilton to explore options for improving energy efficiency in its transportation sector.

**Exhibit 3.5: Actual and Projected World-Wide Discovery, Extraction and Demand for Conventional Oil**

(billions of barrels per year)

Source: Sustainable Transportation Monitor, Centre for Sustainable Transportation, No.2, February 2000, quoting Oberle Oil Corporation; International Energy Agency

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4. REVIEW OF PRACTICES IN OTHER JURISDICTIONS

4.1 Practices in Ontario

4.1.1 THE CITY OF OTTAWA

The City of Ottawa is notable due to its comprehensive approach to managing impacts on GHG emissions from urban growth and auto use. However, its policies have not been in effect long enough to gauge their effectiveness.

The City of Ottawa’s Official Plan, Ottawa 2020, recognizes the need to manage urban growth and car use to produce an urban form that maintains the city’s economic competitiveness and quality of life.

- Among the Official Plan’s goals is for clean air that “does not contribute to climate change.”
- The plan established targets for GHG reduction within municipal operations of 20% by 2005.
- The City’s Transportation Master Plan utilizes themes consistent with efforts to reduce GHG emissions including; minimizing costs, minimizing unnecessary travel, reducing automobile dependence, transportation demand management, keeping neighbourhoods liveable, protecting public health and the environment, encouraging walking, biking and transit use, and making efficient use of current infrastructure and services.
- The City of Ottawa uses initiatives including public awareness campaigns, and voluntary employers based transit pass distribution programs as ways to reduce GHGs.

4.2 Practices Across Canada

4.2.1 THE CITY OF EDMONTON

In 1999, the City of Edmonton approved an Environmental Strategic Plan that recognized the local causes and global impacts of climate change. It made reducing GHG emissions a priority for the city and identified several approaches to reducing GHG including:

- Investing in transportation facilities that provided greater choice for travelers,
- Developing a strategy for the City to reduce municipal GHG emissions,
- Developing strategies to reduce GHG emissions resulting from future urban growth, and
- Developing and maintaining a GHG emissions inventory. The emissions inventory has allowed the City to quantify the sources of GHG emissions and track the effectiveness of initiatives in reducing those emissions.

Since 1999 the City has moved forward on several on these strategies.
• The idea of providing alternative transportation choices has been incorporated into many of the city’s transportation planning initiatives.

• The City developed and adopted an Emissions Reduction Plan for municipal operations. Already approved initiatives are estimated to eliminate 37,000 tonnes of GHG emissions by 2008, save $22.1 million in operational costs. So far the only transportation-related initiative that have been implemented is a training program for municipal vehicle drivers that has achieved a 15% reduction in fuel use.

4.2.2 THE CITY OF CALGARY

The City of Calgary established a Cooperate and Community Climate Change for the reduction of GHG emitted by the City of Calgary’s own operations, complete with goals and timeline. The strategy includes:

• Established specific long-range targets for GHG reduction Calgary hopes to reduce emissions to 6% below 1990 levels by 2012,

• Recognized that the city will need to adapt to future changes in climate, and

• Created an action plan for 2002-2005 that will gather emissions data, establish internal programs to reduce emissions, mitigate the costs of GHG reduction, plan for offsetting the impacts of future climate change, and education for City staff and local residents about climate change.

4.2.3 THE CITY OF VANCOUVER

The City of Vancouver has one of the longest running municipal GHG reduction programs in the world. The City has established a comprehensive urban/transportation-planning framework to manage urban growth. The City has made reducing GHG emissions a part of those plans and has begun to incorporate reduction principles into various community laws and municipal operations. To date these efforts have included:

• Adopting a Corporate Climate Change Action Plan to reduce GHG emissions from municipal operations,

• The City established goals for GHG reduction at 20% below 1990 levels by 2010,

• Requiring new developments be models of sustainable urban development,

• Developing a series of land use and transportation plans that promote practices that will reduce GHG emissions,

• Promoting bicycle use,

• Developing a GHG reduction strategy for municipal operations, including making the municipal fleet more fuel efficient.

4.3 Practices in the United States

In many ways local communities in the U.S. face the same challenges in reducing GHG emissions as Canadian cities. It is not surprising that many local GHG programs in the U.S. are similar to
those in Canada and have developed similar approaches and strategies for reducing GHG emissions.

### 4.3.1 THE CITY OF PORTLAND OREGON

Portland was the first U.S. city to adopt a stance on GHG emissions and global warming. In 1993 the City adopted a goal of reducing GHG emissions to 20% below 1990 levels by 2010. The City's comprehensive plan partnered with other governments and local utility companies to promote public and private initiatives including better energy efficiency in buildings, waste reduction and recycling. Transportation was recognized as the most important element in the City’s emission reduction strategy. Transportation initiatives included:

- Reducing total automobile use with improved transit, carpooling, non-motorized, telecommuting and transportation demand management programs,

- Promote a pattern of compact, mixed use, and pedestrian friendly urban development that reduces car use,

- Testing alternative fuel vehicles,

- Optimize traffic signals to reduce idling, and

- Reduce congestion caused by temporary delays.

In 2001 the City along with the surrounding county adopted a new joint *Local Action Plan on Global Warming* with an updated reduction target of 10% below 1990 levels by 2010. The latest plan identifies government actions and community initiatives needed to achieve the new target. Such actions include:

- Maintaining an inventory of sources and levels of GHG emissions,

- Training on fuel-efficient driving for municipal employees,

- Formally acknowledge the GHG-global warming issue in all relevant transportation and urban development proposal and plans,

- Improving the quality and awareness of transit, walking, bicycling, telecommuting, and ridesharing,

- Making the cost of private auto use reflect the full costs to society,

- Increasing the use of highly fuel-efficient and alternative-fuel vehicles, and

- Changing the pattern of urban development to be more compact and more conducive to mixed uses, walking, bicycling and transit.

### 4.3.2 THE CITY OF MADISON, WISCONSIN

In 2000, the City of Madison adopted its *Climate Protection Plan* to reduce GHG emissions. The plan took a comprehensive approach to reducing emissions and established a community-wide GHG reduction target of 7% below 1990 levels by 2010. The initiatives to reduce GHG from

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transportation included; improving fuel efficiency in the municipal fleet with improved maintenance, efficient driving training, and alternative fuels, encouraging transit use, and managing parking.

4.3.3 THE CITY OF MINNEAPOLIS, MINNESOTA

In 1993 Minneapolis developed a strategy for reducing GHG emissions. The strategy established specific targets for reductions in several areas. According to the *Minneapolis Sustainability Plan*, early initiatives proved successful and the City has reached ¾ of its goal for a 35% reduction in GHG by 2005, mostly by converting one coal-burning power plant to natural gas. In addition to encouraging changes in local business practices, the City’s latest plan includes several strategies for reducing emissions from the transportation sector.

- Downsizing the municipal fleet and using less-polluting fuels and vehicles, and
- Encouraging walking, biking and transit use through expansion of the trails and transit networks.
5. IDENTIFICATION OF POLICY OPTIONS

5.1 Recognizing the Issues

The issues of climate change and energy use are often overlooked as major issues affecting urban areas. The Federal Government has committed to reducing greenhouse gas emissions but achieving the reductions will be difficult unless Canada’s urban areas take immediate action to reduce fossil fuel use from transportation, the largest and fastest growing contributor to greenhouse gas emissions. Similarly, the Federal Government has also recognized the need to conserve energy and prepare for potential shortages, but the impacts may be greatest in urban areas that are heavily reliant on private automobiles and trucks for passenger travel and goods movement respectively.

A first step in the development of policies for the Transportation Master Plan is to simply recognize the link between climate change and energy constraints on the economic and social well-being of Hamilton residents. This is consistent with corporate directions for all future planning in Hamilton.

Vision 2020 is a key policy document that acknowledges the issue of climate change, establishing a goal of reducing greenhouse gas emissions by 20%. Other ways in which these issues can be recognized is through public awareness programs and by ensuring that the impacts of all new projects in the City, both development-related and transportation infrastructure related, explicitly consider impacts on the consumption of energy.

Part of recognizing the issue of energy conservation and climate change also involves cooperation with senior levels of government as well as other municipalities. In this regard, Hamilton should be proactive in approaching the federal government with initiatives that could help achieve reductions in greenhouse gas emissions. Hamilton should also act as a leader and strive to create successful examples of energy reductions that other communities could follow.

5.2 Preparing for Change

The Transportation Master Plan for the City of Hamilton will consider land use issues and transportation needs over the next 20 to 30 years. During this period, the factors that affect our ability to move from one activity to the next may not be the same as they are today. Most significantly, most experts agree that within the next 30 years fuel prices will increase significantly due to a growing gap between world-wide demand and supply. While the evidence on the impacts of climate change over the next few decades is less certain, events such as rising water levels, increasingly severe weather and changing agricultural capacity may also factor into the way transportation is carried out in the future.

Preparing for changes in energy supply and climate change does not mean that the City should immediately abandon motorized travel in favour of walking and cycling. However, there are many decisions that will be made in the near term regarding transportation infrastructure and land development that could affect Hamilton’s ability to respond to changes in the longer term should this be necessary. For example, urban development should be planned so that people can access activities such as stores, recreation and jobs without having to rely on a car. New communities should also be planned so that they can be served efficiently by transit, if not presently, than in the future.

Preparing for change also has an impact on that way transportation funding is allocated. As discussed in more detail in the Transportation Targets Paper, it is recommended that the City of Hamilton start to develop an enhanced bus transit system, starting with the identification of priority bus corridors and incrementally working towards dedicated transit corridors. This will ensure that
the City is not in a position in the future where they can't afford to, or are physically unable to provide the levels of transit service that may be required if automobile travel becomes too expensive for some individuals.

One policy area related to preparing for change is improving the monitoring and tracking of energy consumption from transportation. At the present time, the City does not regularly monitor fuel consumption from transportation nor have realistic projections of fuel consumption been made in recent years. However, the City of Hamilton has been a participant in the Transportation Association of Canada’s Urban Transportation Indicators Survey, which includes data on gasoline fuel use from a private source.

5.3 Making Transportation More Energy Efficient

Automobile travel is the largest producer of GHGs, the sector with the most potential for improvement, and likely the easiest for Hamilton policies to influence. The City has some control over current policies that impact car use and is in a position to affect traveler behaviour.

It is rapidly becoming apparent that most actions taken to reduce energy use of emissions also save money\(^9\). For example, choosing a fuel-efficient vehicle can result in long term savings on the cost of fuel. Some suggested strategies for encouraging more efficient transportation and reduced costs are discussed below.

5.3.1 IMPROVING FUEL EFFICIENCY

Given Hamilton’s high rates of car use, there is potential for small improvements in average fuel economy to have large impacts. Under current legislation, municipalities cannot regulate the types of vehicles that individuals choose to drive, nor can they have a direct influence on the types of vehicles that are offered to consumers. However, there are several areas where the City can have an influence on fuel efficiency, including:

- Educating the public about the impacts of their vehicle choices;
- Limiting fuel losses from idling, through anti-idling by-laws; and,
- Improving the fuel efficiency of the municipal fleet.

The City can lead by example by making fuel efficiency a priority for municipally owned vehicles. The City can also maintain their fleets at peak efficiency, consider using alternative fuels, and continue current programs of purchasing non-polluting, and low-polluting vehicles.

5.3.2 REDUCING MOTORIZED TRAVEL

Communities across Canada are looking at ways to reduce single occupant vehicle use as part of their GHG or energy reduction strategies. One challenge is that vehicle use has increased significantly because the population continues to grow and people are generally travelling more. There are a number of basic approaches for reducing vehicle use, including:

- **Land Use:** reducing the demand for travel by automobile by encouraging more compact, pedestrian oriented development to facilitate walking and reduce the number of trips that require a car,

• **Travel Choices:** encouraging reductions in automobile trips by improving the quality and availability of walking, bicycling, carpooling or transit,

• **Transportation Pricing:** encouraging travelers to divert to other modes of travel by accounting for the full cost of travel in all modes, and

• **Trip Reduction:** encouraging businesses and employees to substitute trips through telecommunications.

These general policy options for reducing motorized travel are discussed in other policy papers.
6. RECOMMENDED POLICIES

Based on the above review, the following policies are recommended for consideration in the Transportation Master Plan:

<table>
<thead>
<tr>
<th>Recommended Policy</th>
<th>Implementation</th>
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</table>
| Recognize the importance of energy conservation in transportation and ensure that the City of Hamilton plays a role in helping to achieve Canada’s commitment to reducing greenhouse gas emissions. | - Commit to targets for reducing auto use as outlined in the *Transportation Targets* Policy Paper.  
- Establish a GHG monitoring program to identify the amount and source of GHG emissions from transportation in Hamilton.  
- Maintain the commitment to reducing greenhouse gas emissions as set out in Vision 2020.  
- Increase public awareness of the relationship between individual travel decisions and the ability of the City and the country to reduce energy.  
- Proactively work with the federal government, in cooperation with other municipalities, to find ways that Hamilton can most effectively reduce energy consumption from transportation.  
- Work with Clean Air Hamilton, Green Venture, the Southern Ontario Clean Airshed Network Initiative, Environment Hamilton, and other groups to help develop and promote initiatives that reduce fossil fuel consumption. |

<table>
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<tr>
<th>Recommended Policy</th>
<th>Implementation</th>
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</table>
| Ensure that Hamilton residents and businesses are able to respond to a potential future wherein the availability and price of fossil fuels makes travel by car financially difficult. | - Plan urban development so that travel by car is an option, not a necessity.  
- Incrementally expand the transit system with the intent of establishing a network of high capacity transit corridors connecting major activity nodes throughout the City. |
**Recommended Policy**
Reduce the amount of fossil fuels used by transportation in Hamilton by improving vehicle efficiency and reducing motorized travel, starting with municipal fleets and activities.

**Implementation**
- Investigate ways to improve the efficiency of routed vehicles (transit, garbage, etc.).
- Train vehicle operators in low-emission driving techniques and institute a No-Idling rule for the municipal fleet.
- Investigate opportunities to downsize municipal fleets.
- Purchase new conventional-fuel vehicles and eliminate older, less efficient vehicles.
- Explore the use of alternative fuels and hybrid vehicles in all municipal fleets.
- Provide incentives for its employees to commute to work via less polluting modes, such as walking, biking, transit, or carpooling.
- Expand opportunities for people to walk or bicycle with paths, trails and bike lanes.
- Encourage telecommuting.
7. EVALUATION OF POLICY OPTIONS

7.1 Evaluation Criteria

Evaluation of policy options is based on criteria for achieving sustainable growth and development across all of the policy papers developed in this project. They fall under the three major categories of **social, economic and environmental** impacts, and they are described briefly below.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Acts on</th>
<th>Description (or examples)</th>
</tr>
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<tbody>
<tr>
<td><strong>Social</strong></td>
<td>Residential communities</td>
<td>Improves quality of life in neighbourhoods</td>
</tr>
<tr>
<td></td>
<td>Safety and security</td>
<td>Reduces collisions; improves personal safety and security</td>
</tr>
<tr>
<td></td>
<td>Ease of implementation &amp;</td>
<td>Provides clarity, measurability, accountability</td>
</tr>
<tr>
<td></td>
<td>governance</td>
<td></td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td>Development</td>
<td>Attracts employment, capital, optimal use of transportation</td>
</tr>
<tr>
<td></td>
<td>Land value</td>
<td>infrastructure capacity, and future land use</td>
</tr>
<tr>
<td></td>
<td>Operating and capital costs</td>
<td>Reduces or defers public and private costs of transportation</td>
</tr>
<tr>
<td></td>
<td>Congestion</td>
<td>Improves traffic flow (or slows deterioration thereof)</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>Air quality</td>
<td>Reduction of Criteria Air Contaminants</td>
</tr>
<tr>
<td></td>
<td>Noise and vibration</td>
<td>Minimizes noise impacts</td>
</tr>
<tr>
<td></td>
<td>Natural environment</td>
<td>Improves water quality, green spaces, flora and fauna etc.</td>
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</table>

Obviously, most policies pertaining to greenhouse gas emissions are directly related to air quality. Depending on the scope of the policy options GHG control programs can have significant effects on social and economic facets of the community as well. Because of the prevalence of fossil fuel in transportation energy use policies for reducing GHG emissions should be subject to cost/benefit analysis. Such an analysis will require a precise understanding of GHG emission patterns in Hamilton and the costs and benefits of various policies. Such an analysis is beyond the scope of this paper.

The rating system that will be used to apply these criteria is a visual five-point scale, to reflect a range from strong positive impact to strong negative impact. (+, +, o, --, --)

+ Represents the strong positive impact, o represents absence of significant impact either way, and -- represents strong negative impact.
7.2 Summary of Evaluation

The factors described in Section 7.1 are applied to the policy recommendation described in Section 6. The results of the preliminary qualitative assessment using the rating scheme described previously are provided in Exhibit 7.1.
### Exhibit 7.1: Impacts of Policy Options

<table>
<thead>
<tr>
<th>Policy Option</th>
<th>Social</th>
<th>Economic</th>
<th>Environmental</th>
</tr>
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<tbody>
<tr>
<td>Recognize the importance of energy conservation in transportation and ensure that the City of Hamilton plays a role in helping to achieve Canada’s commitment to reducing greenhouse gas emissions.</td>
<td>+ 0 + 0 + 0 - + 0 + + +</td>
<td>+ 0 + 0 + 0 0 + + +</td>
<td>+ 0 + 0 + 0 0 + + +</td>
</tr>
<tr>
<td>Ensure that Hamilton residents and businesses are able to respond to a potential future wherein the availability and price of fossil fuels makes travel by car financially difficult.</td>
<td>+ 0 + 0 + 0 0 0 0 + + +</td>
<td>+ 0 + 0 + 0 0 + + +</td>
<td>+ 0 + 0 + 0 0 + + +</td>
</tr>
<tr>
<td>Reduce the amount of fossil fuels used by transportation in Hamilton by improving vehicle efficiency and reducing motorized travel, starting with municipal fleets and activities.</td>
<td>+ + + + + + + + +</td>
<td>+ + + + + + + + +</td>
<td>+ + + + + + + + +</td>
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