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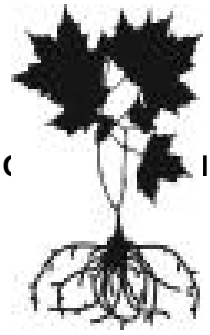

DRAFT FOR DISCUSSION

A PLAN TO ACHIEVE 20 PER CENT OF THE KYOTO TARGET

ATTACHMENT A

September 2001

A Plan
To achieve 20 per cent of the
Kyoto Target

Project Investments	Tonnes GHG 2010
Waste Diversion	3.6 - 10 Mt
Landfill Gas Capture and Utilization	6.5 Mt
Municipal Procurement	1.8 Mt
Community Energy Systems and Combined Heat and Power	3.5 - 10.3 Mt
Transportation	10.0 Mt
Community Greening	1.0 Mt
Total	40 Mt

Executive Summary

FCM is proposing that the Government of Canada, working with provincial and territorial governments, partner with municipal governments to achieve up to one-quarter of the Kyoto Target. This plan provides an initial assessment of options and costs and identifies initial opportunities for achieving 20 per cent of the target by 2010 or 40 million tonnes of greenhouse gas reductions. Subsequent assessments, and lessons learned through project implementation, will be used to identify additional options to reach a target of 50 million tonnes (Mt) of greenhouse gas reductions in communities by the end of the Kyoto target implementation period of 2012.

FCM is proposing a package of measures aimed at securing significant greenhouse gas reductions and improvements to air quality and contribute to multiple community goals and quality of life.

The measures are based on the work of the Municipalities and Transportation Tables established along with 14 other sector tables to assess options for reaching the Kyoto Protocol target. Sector experts worked for more than a year to identify and analyze greenhouse gas reduction opportunities in communities. Hence, these proposals have already undergone significant peer review. The Municipalities Table recommendations have also been endorsed by FCM's National Board of Directors and its members through approval of the Environmental Issues Policy Statement.

Summary of investments, reductions and costs

Category	**GHG reductions in 2010 Millions of Tonnes (Mt)**	**Total Cost to Government of Canada (Millions) over five years**
Green Funds	Included in below	$125
PCP/Data	Included below	$0.650
Infrastructure Canada:		
Waste Diversion	3.6 – 10 Mt	$35
Landfill capture/utilization	6.5Mt	$50
Municipal Procurement	1.8 Mt	$75
CES/CHP	3.5 – 10.3Mt	$50
Transportation	10 Mt	$10
Community Greening	1 Mt	To be determined
Total	**40 Mt**	**$345.6**

Investment in 2002 federal budget: $70 million; tripartite investment in 2002: $210 million. The Green Municipal Funds would cover the cost of feasibility studies for all these projects (not covered by Infrastructure Canada) and would invest in innovative technologies to continue to pull the municipal marketplace.

This package of measures has been designed to generate maximum leverage. Community energy systems, combined heat/power and landfill gas utilization projects, for example, can demonstrate effective public/private partnerships. In community energy systems, municipal governments can retain ownership of the underground pipe network, while the private sector owns and operates the heat and power plants. Landfill gas utilization projects often include municipal ownership of landfills with private sector ownership of on-site turbines to generate electricity.

The potential reported here does not include upstream greenhouse gas reductions from recycling and enhanced solid waste management programs. Some types of materials (e.g. paper products, aluminum, steel, plastics) are manufactured with processes that are energy and greenhouse gas intensive, especially when made from fresh raw materials (e.g. wood pulp, bauxite, iron ore, petroleum) as opposed to recycled materials. For example:

- The fuel and electricity required to make a tonne of paper product results in 2 to 3.5 tonnes of carbon dioxide emissions from the manufacturing process, depending on the type of paper. To the extent the recycling of paper products reduces the need for pulpwood, there can be an additional positive impact in the preservation of the forest carbon sink.
- Aluminum manufacturing not only uses large amounts of electricity (which may or may not be greenhouse gas intensive, depending on the type of generation being used) but also emits perfluoromethane and perfluoroethane, substances with Global Warming Potentials of 6,500 and 9,200, respectively. Recycling a tonne of aluminum cans reduces greenhouse gas emissions by 10 - 12 tonnes of equivalent CO_2 and more in some circumstances.
- Recycling steel cans and other steel products reduces manufacturing carbon dioxide emissions by about two tonnes for every tonne of recycled material.
- Recycling plastics reduces carbon dioxide emissions in the manufacturing process by two to three tonnes for every tonne of recycled material, with the largest impacts coming from high-density polyethylene (HDPE) and polyethylene terephthalate (PET).

These programs represent one area where municipalities can significantly influence the greenhouse gas emissions of some of the most energy-intensive industries in Canada. A conservative assumption puts the potential in the order of an additional 25 Mt (recoverable upstream emissions from solid waste) if extended producer responsibility programs were widely instituted.

Introduction

Municipal governments spent more than $45 billion in 2000, accounting for 10 per cent of all government spending. Municipal governments employed 247,000 Canadians in 2000, more than any other order of government. Capital spending by municipal governments is expected to top $8.3 billion in 2001, accounting for over 50 per cent of all public capital investment this year. [1]

The municipal government asset portfolio includes roads, highways, traffic and transit systems, water supply, solid waste management and sewage treatment facilities, street lighting, public housing and a wide variety of vehicles, buildings, machinery and equipment.

These assets consume large amounts of energy in providing services to citizens.

Municipal governments consume energy in their own operations (direct control) and influence directly or indirectly energy consumption and emissions throughout communities through land-use and transportation planning, codes, bylaws and procurement.

According to the Municipalities Table Foundation Paper, the four major categories of fuel and electricity used in municipal operations are buildings, water and sewage treatment facilities, vehicles and streetlights. Comprehensive data exists for building energy use and indicates a typical annual energy use of about 750 MJ/capita. Water supply and sewage treatment add another 750MJ/capita, and this is mostly electricity.

The vehicle fleet and street lighting typically each contribute about 250 MJ per capita to the total municipal energy bill, to bring the total to 2,000 MJ/capita. For a city of 100,000 providing these services, this would indicate an annual energy use in the range of 200,000 GJ. The corresponding energy bill depends on the mix of fuel and electricity and local prices, but the fuel:electricity ratio for a city providing all these services would typically be about 50:50, and the total annual cost for fuels and electricity would, in this example, be in the range of $2 - $2.5 million.

A conservative estimate of fuel and electricity consumption by Canadian municipal governments would be in the range of 60 million GJ, with a corresponding fuel and electricity bill in the range of $600 - $800 million annually generating 4 million tonnes of greenhouse has emissions.

The potential for greenhouse gas reductions is, however, far greater than indicated by an assessment of municipal operations. Municipal governments have the potential directly or indirectly (through planning, codes, bylaws) to influence up to half of Canada's greenhouse gas emissions (360 Mt). This plan identifies opportunities for greenhouse gas reductions in municipal operations and throughout the community.

Link to FCM's 2001 Federal Budget Submission

[1] Statistics Canada, Public and Private Capital Expenditures, Government Services, August 2001.

FCM's 2001 Federal Budget Submission elaborates on opportunities for making the current tri-partite Infrastructure Canada program permanent and for increasing investment over the next five years in water and other municipal infrastructure. Separate programs are being called for to invest in inter-modal, integrated transportation systems, brownfield redevelopment and affordable housing.

FCM is proposing a phased approach, with initial increased investments announced in the 2002 budget and scaling up to proposed levels within five years.

FCM is seeking up to $1 billion per annum in federal investment within five years through Infrastructure Canada for water infrastructure and an additional $700 million in federal contributions to Infrastructure Canada for non-water infrastructure investments (for a total of $1.7 billion within five years).

Finally, the FCM 2001 Federal Budget Submission includes a call for increased investment in the Green Municipal Enabling Fund of $125 million over five years ($25 million/year) for increased investment in existing categories and the addition of brownfields redevelopment (this would bring available resources to about $30 million/year for five years).

This proposal demonstrates how a portion of the additional $700 million Infrastructure Canada funding and the additional $125 million for the Green Municipal Enabling Fund could generate greenhouse gas reductions, air quality and health benefits. Investments would focus on: buildings/facilities; waste diversion; landfill gas capture and utilization; community energy systems and combined heat and power; renewable energy and transportation demand management.

Green Municipal Funds

The Green Municipal Funds have a critical role to play, in partnership with the Government of Canada, in reducing community greenhouse gas emissions.

As of the August 2001, FCM had approved 115 projects. Of these, 29.6 per cent fall into the energy category, 40 per cent in water, 22.6 per cent waste; 4.3 per cent transit and 3.5 per cent are in the integrated category (community energy plans, greenhouse gas inventories).

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To date, the Green Municipal Funds have committed $5,265,923 in grants and $3,402,500 in loans to 115 projects (107 Enabling Fund; 8 Investment Fund) for a total project value of $42,539,712. Of these amounts, $3,380,694 has been committed in grants and $2,750,000 in loans so far in fiscal 2001-2002. FCM has set a national target of $5 million in grant disbursements from the Enabling Fund and $10 million from the Investment Fund for fiscal 2001 – 2002.

The Green Municipal Funds Council will meet again in November 2001 and so is likely to reach the national target for the Enabling Fund. A number of projects are in the development stage for the Investment Fund and staff is confident the national target can be met for fiscal 2001-2002.

The impact of projects will be tracked for reductions in a range of pollutants, including greenhouse gas reductions, as they are completed. It is clear, however, that with so many projects focused on the waste, energy and water categories, that air and climate pollution reductions will be significant over time.

The current endowment has established the 25-million Green Municipal Enabling Fund and the $100-million Green Municipal Investment Fund. The Enabling Fund is the only mechanism available to municipal governments for funding feasibility studies for projects suitable for the Infrastructure Canada program and the Investment Fund. It provides up to $5 million a year over five years for up to half the cost of feasibility studies. FCM will not have any difficulty distributing this annual allocation.

With increased Funds promotion and outreach, FCM anticipates it could significantly increase distribution of Enabling Fund grants.

In its 2001 Federal Budget Submission, FCM proposes increasing the allocation to the Green Municipal Enabling Fund to $25-million a year for five years for a total of $125 million. This would bring the annual total available to Canadian communities to about $30 million/year for five years. FCM has also asked that funding categories be expanded to include brownfields redevelopment.

In addition to additional Enabling Fund resources, FCM is seeking increased flexibility in managing the Funds, particularly the Investment Fund.

The Investment Fund is working to establish its niche in the marketplace. Restrictions on loan interest rates and the level of financial participation allowed for the Fund have created challenges. FCM is interested in exploring options with the Government of Canada that would increase flexibility in the Investment Fund.

In addition, the current focus is on projects or studies that emphasize energy and/or process efficiency. The Funds do not support communication, education or community greening activities. FCM would be open to including such activities. Finally, the Green Municipal Funds want to ensure resources are available to communities for innovative activities like community energy planning and development of greenhouse gas inventories.

Provincial/Territorial Participation

All orders of government currently participate in the Infrastructure Canada program. FCM prefers the same tri-partite process for these additional investments, although the Government of Canada may wish to enter into bilateral arrangements if provinces choose not to participate. The Government of Canada may also want to encourage provinces to match investments made by the Green Municipal Funds.

Principles

The Municipalities Table developed options using the following principles:

1. Co-operate and collaborate with other orders of government, public organizations, private citizens, business and industry;
2. Identify measures that are cost effective, sustainable and meet community priorities;

3. Assess the potential to exceed the Kyoto target as demonstrated in the targets set in the Partners for Climate Protection program;
4. Avoid unreasonable burdens or disadvantages for any community or region, and
5. Promote an improved quality of life for Canadians living in municipalities.

FCM's National Board of Directors and its membership have endorsed these principles through approval of the following:

- sustainable community development should be the overarching principle guiding the climate negotiations. Greenhouse gas reduction opportunities should consider the positive effects on a wide range of needs, including improvement to health and the local environment, competitiveness and cost-effectiveness;
- the co-benefits of domestic greenhouse gas emission reductions should be emphasized while ensuring that actions distribute the burden/opportunities fairly and equitably across the country;
- Canada (federal, provincial/territorial) should aim to achieve at least 75 per cent of its Kyoto target domestically to maximize the co-benefits (improved local air quality, health protection, local job creation, innovation);
- partnerships with municipal governments must be emphasized both for greenhouse gas reductions and for investment in adaptation to climate change; and
- FCM members should aim to achieve 100 per cent of their greenhouse gas reductions domestically.

The proposals outlined here achieve multiple environmental and health objectives, including air quality, and contribute to other national goals such as increasing uptake of innovative technologies.

In addition, measures like community energy systems, combined heat/power and landfill gas utilization can demonstrate effective public/private partnerships. In community energy systems, for example, municipal governments can retain ownership of the underground pipe network, while the private sector owns and operates the heat and power plants. Landfill gas utilization projects usually include municipal ownership of landfills with private sector ownership of on-site turbines to generate electricity.

Through these kinds of partnerships municipal governments can significantly influence community energy management, supply and greenhouse gas reductions.

The Opportunity

Municipal governments have direct and indirect control or influence over half of Canada's greenhouse gas emissions:

Community Greenhouse Gas Emissions in Canada under the Direct Control, Indirect Control or Influence of Municipal Governments, 1990 (Full Cycle End Use Allocation of Emissions for both Electricity and Fossil Fuels) End Use Sector Megatonnes of eCo2 in 1990

Direct Control		
Municipal Operations	4	
Landfill Gas		18
The Management of Residential Waste		16
Sub-Total Municipal Governments Direct Control Emissions		*38*
Indirect Control and Influence		
The Management of or Influence over the Management of Industrial, Commercial and Institutional (IC&I) Solid Waste		48
Residential Buildings	84	
Commercial and Institutional Buildings		49
Industry (with exclusions described in text)	31	
Personal and Freight Transportation in Communities		110
Sub-Total Indirect Control and Influence Emissions	*322*	
Total Municipal Government Direct Control, Indirect Control and Influence		**360**

Enabling Measures

Project execution must be preceded by investment in capacity building, data collection and stakeholder engagement. FCM has been engaged in this work for many years and is feeling the pressure of its success.

The Partners for Climate Protection Program

Almost 90 municipal governments across Canada have joined the Partners for Climate Protection (PCP) program. It is expected that by the end of 2001, 100 municipal governments will be participating, including all capital cities. The recommended targets for participants are 20 per cent in greenhouse gas reductions from municipal operations and a minimum of 6 per cent from the community as a whole within 10 years of joining the program. Communities follow a five-step milestone process that begins with completing an inventory and projection. Most communities are only just entering PCP and so are at Milestone One and are struggling to secure data and complete inventories. Human and financial resources are limited and FCM is struggling to support the increasing needs of these communities. The program currently has four funders: Health Canada at $45,000; Environment Canada at $69,000, Natural Resources Canada at $30,000 and the Climate Change Action Fund that has indicated its interest in renewing funding at $250,000/year for three years. The program, however, is seriously under-

resourced in comparison to comparable U.S. and Australian programs with funding in excess of $1 million in each country with each program employing up to 10 full and part-time staff. The U.S. and Australian programs have approximately 100 participants each.

FCM has two full-time people and one half-time person working on PCP.

The Municipal Building Retrofit Program has three full-time staff and is funded at $540,000/year by Natural Resources Canada. It is expected the program will be renewed next fiscal year. The focus of the program is broader than greenhouse gas reductions. The national fuel mix for electricity would reduce interest in Quebec, Manitoba, Newfoundland, and British Columbia if greenhouse gas reductions were the only goals.

The Green Municipal Funds support investments by municipal governments in greenhouse gas reduction projects. PCP, however, is focused on building the foundation for action, not projects. Resources available for Green Municipal Funds operations, therefore, are not widely available to PCP and other FCM programs.

FCM is also working with an increasing number of private sector players to explore options for increasing investment in the program. These discussions should bear fruit over the coming months.

FCM is seeking an additional (beyond that already committed as noted above) $250,000 to support increase PCP capacity to meet the needs of municipal governments.

The Need for Data

In research conducted by FCM and by the Task Force assessing options for establishing a Canadian Information System on the Environment (CISE), municipal governments have consistently reported a need for data, rather than protocols and frameworks. FCM has advocated strongly for support for completing comprehensive community greenhouse gas (and air) inventories. The aim is to secure individual inventories and to normalize the data so that national aggregation, trend analysis and results reporting can take place. Resources must be made available to assist municipal governments in identifying data needs, securing resources to collect and manage data and to report to FCM for national roll-up.

FCM believes that $400,000 should be allocated to meet data collection needs of municipal governments.

Project Investments

FCM proposes that the Government of Canada, working with provinces and territories, commit to achieving one-quarter of the greenhouse gas reductions (200 Mt+) required to meet the Kyoto target through investment in communities, a total of approximately 50 Mt.

These initial investments would take Canada toward the target of 50 Mt; measures and their outcome would be reviewed regularly so that programs could be modified and additional options identified.

Priority investments would include:

1. Waste Diversion[2]

The Municipalities Table Options Paper notes that when solid waste is diverted from landfill sites, either through an absolute reduction, or through alternative management options (recycling, composting, and incineration), greenhouse gas emissions are affected in a number of ways.

First, to the extent the solid waste is organic (and about 66% of landfilled waste in Canada is organic) diverting it from landfills ensures that it will not become feedstock for methane generation. For every tonne of waste that is landfilled, 40-100 kg of methane will eventually be produced. Canadians landfill some 24 million tonnes of waste each year and every tonne of methane has a global warming potential 21 times that of carbon dioxide, so the eventual methane emissions commitment represented by this landfilled waste is approximately 20-50 Megatonnes of equivalent CO_2 per year (lifetime methane yield of organic waste landfilled). These methane emissions will generally not begin until a year or two after the waste is landfilled (depending on local waste composition and landfill conditions and operating procedures) but will continue for many decades.

Secondly, some types of materials (e.g. paper products, aluminum, steel, plastics) are manufactured with processes that are energy and greenhouse gas intensive, especially when made from fresh raw materials (e.g. wood pulp, bauxite, iron ore, petroleum) as opposed to recycled materials. For example:

- The fuel and electricity required to produce a tonne of paper product results in 2 to 3.5 tonnes of carbon dioxide emissions from the manufacturing process, depending on the type of paper. To the extent the recycling of paper products reduces the need for pulpwood, there can be an additional positive impact in the preservation of the forest carbon sink.
- Aluminum manufacturing not only uses large amounts of electricity (which may or may not be greenhouse gas intensive, depending on the type of generation being used) but also emits perfluoromethane and perfluoroethane, substances with Global Warming Potentials of 6,500 and 9,200, respectively. Recycling a tonne of aluminum cans reduces greenhouse gas emissions by 10 - 12 tonnes of equivalent CO_2 and more in some circumstances.
- Recycling steel cans and other steel products reduces manufacturing carbon dioxide emissions by about two tonnes for every tonne of recycled material.
- Recycling plastics reduces carbon dioxide emissions in the manufacturing process by two to three tonnes for every tonne of recycled material, with the largest impacts coming from high-density polyethylene (HDPE) and polyethylene terephthalate (PET).

These "upstream" emission reductions occur mostly in the *Extended Influence* category of municipal greenhouse gas emissions, but recycling and solid waste reduction programs represent one area in which municipalities can have a very significant influence the greenhouse gas emissions of some of the most energy intensive industries in Canada. **A conservative assumption indicates that the potential would be in the**

2 Details on waste diversion, landfill capture, community energy systems, transportation and community greening taken from Municipalities and Transportation Table Foundation and Option papers.

order of 25 Mt (recoverable upstream emissions from solid waste) if extended producer responsibility programs were widely instituted.

When combined with the reduction in future landfill methane emissions that result from the reduction or recycling of organic wastes, the role of community "3R programs" in mitigating greenhouse gas emissions looms large. The trend away from the "once through" society to the "recycling society" is one of the keys to both short and long-term climate change mitigation strategies. In addition to the equivalent CO_2 (eCO_2) in methane emissions that eventually result from the organic waste being landfilled in Canada every year, even conservative assumptions indicate there is a nearly equal potential for upstream emission reductions by diverting waste from landfill through reduction and recycling programs.

The Municipalities Table Options Paper estimated that a national target of 70 per cent diversion by 2015 could reduce greenhouse gas emissions 3.6 – 10 Mt by 2010 with reductions reaching 5.7 – 12 Mt by 2020. Average savings derived from the measure: 3.71/tonne. Total program costs for all orders of government need to be developed, but could begin with increased emphasis within larger funding commitments to the Infrastructure Canada program.

FCM recommends that within five years $35 million be available from the Government of Canada for Infrastructure Canada to invest in waste diversion (for a tripartite total of $105 million).

This effort will require renewed emphasis of the Canadian Council of Ministers of the Environment as they have dropped waste management from their list of priorities.

2. Landfill Gas Capture and Utilization

Landfill methane contributed about 18,000 kilotonnes of equivalent CO_2 to Canada's greenhouse gas emissions in 1990, after allowing for the 4,400 kilotonnes of equivalent CO_2 reduction from existing methane recovery operations. This methane is generated from organic waste that was landfilled in the years prior to 1990, so-called "waste-in-place". Even without any additional organic waste being landfilled, the waste-in-place in municipal landfills in Canada will continue to generate methane on this scale well into the next century. It is estimated that an additional six million tonnes a year (CO_2 equivalent) can be recovered.

Landfill gas emissions are a major source of anthropogenic methane, accounting for 26 per cent of the methane emissions from Canadian sources. Methane has a Global Warming Potential of 21 relative to carbon dioxide; methane emitted from Canadian landfills are equal to the emissions from more than five million automobiles. In addition to its contribution to greenhouse gas emissions, and of greater concern to the municipalities operating landfills, are the other negative impacts from landfill gas emissions. These include: nuisance odours; health risks from toxic and carcinogenic trace substances in the landfill gas; risk of explosions from the build up of the gas at the sites themselves or in nearby buildings and structures; contribution to smog in the area due to the volatile organic compounds in the gas; and stress on vegetation in the vicinity of the landfill (which in turn can lead to soil erosion and related problems).

About 25 per cent of the landfill gas emitted by Canadian landfills is captured, and of that, about 70 per cent of the gas is utilized, the remaining 30 per cent is flared. The majority of the gas is used for electricity generation (6 facilities generate a total of 82.5 MW of electricity from 197 kt/year of CH_4). Other applications range from simply heating buildings, to providing fuel for a gypsum manufacturing plant, a cement plant and a recycling plant.

With only 25 per cent of landfill gas emissions currently being recovered, there is a significant opportunity for increased landfill methane capture. Capital costs for landfill gas collection systems represent only 1 – 5 per cent of the total cost of operating a landfill site, when compared with tipping fees in the range of $40 -$60 per tonne. The capitalized costs of a collection system are in the range of $1 - $2 per tonne of waste.

The technologies for cleaning and utilizing the gas are mature, and the capital costs of electricity generation (in the range of $800 - $2,000 per kW of capacity) and other applications are competitive with alternatives. Only B.C., Ontario and Québec have current guidelines or regulations which mandate landfill gas recovery. The scope of regulation in Canada does little to influence the installation of gas recovery systems on existing landfills and on new landfills with smaller than 1 megatonne capacity. In fact, for the majority of landfills in Canada with landfill gas recovery systems, the motivating factors for installation have been odour, control of underground migration and reduction of health risks.

The Municipalities Table Options Paper estimates that over the next 20 years 6.5 Mt of greenhouse gas emissions could be reduced at the 47 most promising sites across Canada through capture alone. The measure anticipates regulations being used to require capture and utilization. Using the fuel to generate electricity would reduce emissions by an additional 600 – 700 kilotonnes.

Voluntary approaches using Infrastructure Canada (and now Green Municipal Funds) projected 5.5 Mt in greenhouse gas reductions over the next 20 years at a cost of $1.24/tonne.

The Municipalities Table Options Paper estimates the following costs for the Infrastructure Canada program:

Municipal/Private sector: $10 million/year over five years
Federal/provincial: $10 million/year over five years

Cost is $1.24 per tonne reduced.

The current Infrastructure Canada program and the Green Municipal Funds support landfill gas capture and utilization projects.

FCM recommends that the Government of Canada allocate $50 million over five years to the Infrastructure Canada program (for a tripartite total of $150 million from all orders of government).

3. Municipal Procurement

The Government of Canada established two important targets in its 2000 Action Plan on Climate Change:

A. *Expand the use of low- or non-emitting energy sources to four times current levels by:*

- purchasing 20 per cent of federal electricity requirements from emerging low- or non-emitting sources; (The Government of Canada will seek partnerships with provinces and large electricity users in industry to support large scale projects that will lower the cost of these technologies and make these sources of electricity a more viable option for industrial and residential consumers.);
- providing a financial incentive to emerging renewable energy distributors to stimulate sales in residential and small-business markets; (This will encourage shifts in consumer behaviour that will expand the market for electricity from new non-emitting sources.);
- installing emerging non-GHG emitting technologies at government facilities; and
- installing emerging renewable energy technologies both in demonstration projects and to supplement diesel generation in remote and northern communities, that are not connected to the main electricity grid.

B. Government Procurement

The 2000 Action Plan on Climate Change noted the following:

"The Government of Canada is the country's largest single enterprise. It is working to get its own house in order by setting a target of a 31 per cent reduction in GHG emissions, from its own operations, by 2010.

Since 1990, through building retrofits, better fleet management, strategic "green power" purchases, and the downsizing of operations, the Government of Canada has already achieved a 19 per cent reduction. The Government of Canada will reduce its emissions by a further 12 per cent by 2010.

The Government of Canada will achieve its goal by additional building retrofits, fuel switching, and increased use of renewable energy within government operations. Moreover, the Government can help to "create the market" for certain new technologies on the verge of becoming viable.

Key departments, which are responsible for 95 per cent of government GHG emissions, will be assigned specific targets and will be required to report annually on their progress."

At the time of the Government of Canada commitments, FCM announced its intention to work with its members to achieve the same targets. FCM proposes the following to achieve these goals:

- Municipal Buildings/Facilities: commitments already are extensive with support through the Municipal Building Retrofit Program, the Green Municipal Funds and the Infrastructure Canada Program. FCM proposes

using existing resources to target municipal building retrofits that achieve 30 per cent reductions in greenhouse gas emissions from retrofits. The Green Municipal Funds already are focused on such targets. Up to 1 Mt of greenhouse gas reductions could be achieved through retrofit of municipal buildings and facilities.

- To facilitate the purchase of 20 per cent of municipal electricity requirements from low-or-non-emitting sources, FCM proposes that the Government of Canada provide contributions to cover cost premiums of up to 3 cents kWh for green power electricity purchased by municipal governments. With approximately 30 million GJ of electricity consumed annually by municipal governments, a commitment to purchase 20 per cent from green power at a 3 cent per kWh premium would cost $50 million. FCM proposes that $15 million be allocated by the Government of Canada in 2002 to the Infrastructure Canada program for this purpose (for a tripartite total over five years of $225 million). It is estimated that up to 800,000 tonnes of greenhouse gas emissions could be saved by 2010.
- Municipal governments can only do so much through municipal purchases. Municipal retail and generator utilities can increase renewable energy supply if demand is there. A consumer green energy credit as called for by the Cleaning the Air with Renewable Energy (CARE) coalition is also essential.

4. Community Energy Systems and Combined Heat and Power

As noted by the Municipalities Table Options Paper, community energy systems (CES) replace individual buildings' boilers, furnaces or chillers with a system that brings heat to buildings in the form of hot water and cooling as chilled water. Heated or chilled water is supplied from one or more central heating and cooling plants or sources of waste heat, and is distributed to end users through buried pipes. Most community energy systems around the world provide heating only. However, a few systems in North America also provide cooling.

Key advantages of community energy systems include the flexibility of switching between and mixing different fuels and energy sources, and the potential improvement in the overall utilization of heat energy in the community. Community energy systems are designed to provide for the space and domestic hot water heating needs of businesses and residences.

Typically, moderate temperatures of 60^0C or less are required. Thus, low-grade, waste heat from industrial activities or power production is sufficient, creating the opportunity for mixing waste heat sources in the community with the need for low temperature space and water heating and cooling.

In combined heat and power systems (CHP), the waste heat from power generation provides the heat source for the community energy system. CHP systems can achieve energy efficiencies far beyond what power generation or heating systems can achieve on their own.

Typical thermal electrical generating stations are able to convert only 35 per cent of usable energy to electricity. However, CHP systems can convert 85 per cent of a fuel's usable energy into electricity or for use in heating.

Community energy systems can burn municipal solid waste, methane from landfill sites and sewage gas. Renewable fuels such as wood and wood waste from sawmills, and peat can be used. Provided the trees are harvested in a renewable manner, the net CO_2 released into the atmosphere is zero. Traditional fuels, such as natural gas can also be used. Community energy systems can be easily converted to use different fuels, as they become available and economical.

Community energy systems reduce emissions through higher levels of energy efficiency, combining heat and power production, and better emissions controls. Substations use less space than conventional heating and cooling equipment and need less maintenance than conventional building heating and cooling equipment.

The benefits of community energy systems include the funneling of dollars into the creation of local jobs rather than imported fossil fuels, energy self-reliance, reliability and reduced maintenance of heating systems, and increased floor space for commercial/institutional buildings. Additional benefits include the ability to use a variety of local low-grade fuels, such as peat, biomass, industrial waste heat and municipal refuse.

The Municipalities Table Options Paper suggests that between 3.5 – 10.3 Mt of greenhouse gas reductions could be achieved by 2010 if CHP were installed in 15 – 40 per cent of high density neigbourhoods; 7.5 – 25 per cent of medium density neighbourhoods and between 3.5 per cent – 7.5 per cent in low-density neighbourhoods.

Federal/provincial/territorial/municipal government investment is estimated at $186 million; private sector at $1,109 million with revenues of $4,223 million. The Government of Canada contribution over the next five years: $50 million (for a tripartite total of $150 million). It should be noted that the Municipalities Table recommended a revolving fund mechanism be used for community energy systems and combined heat and power.

5. Transportation

Transport Canada, under Minister David Collenette's leadership, has initiated an 18-month Blueprint process to assess options for Government of Canada investment in public transit. While that process is not yet complete, FCM believes that the Transportation Table offers ideas that could be implemented now in partnership with other orders of government.

Passenger Package

Passenger travel represents an important area in which to reduce emissions from transportation, particularly in urban areas. It accounts for the bulk of transportation GHG emissions, but involves changing the travel, commuting and living habits of millions of Canadians who make billions of trips to work, shopping, school and recreational activities.

Most of the measures are aimed at urban travel, which accounts for 60 per cent of passenger transportation emissions. The Table's analysis, which was reinforced by the three case studies in Montreal, Toronto and Vancouver, emphasized the importance of

integrated strategies that combine reinforcing actions addressing public behaviour, demand, technology, infrastructure and land use across urban regions.

The most promising measures include early actions that would increase public awareness and send signals to change travel behaviour, primarily in urban areas. Combined, these measures could reduce emissions by 3.7 Mt, or about 7 per cent of Canada's Kyoto target in transportation, and generate a net benefit of $100/tonne. The measures are generally voluntary and are expected to meet with general public acceptance. Telecommuting and car-sharing programs would reduce the number of automobile trips, whereas enhanced driver education would increase the energy efficiency of driving practices.

The promising measures are a more aggressive effort to promote cost-effective alternatives to automobile use. The package combines strong incentives for alternatives such as transit and biking, while discouraging car use through charges on parking. Taken together, the promising measures would achieve an
estimated GHG reduction of 10.1 Mt, or 19 per cent of the transportation target, at a cost of $49 per tonne.

The four transit measures are aimed at increasing transit use in urban centres through subsidies to reduce the price of transit, improving transit services and expanding infrastructure. These would generate reductions of 9.3 Mt or 17 per cent of the Kyoto target in transportation, with significant benefits in urban air-quality and congestion.

The biking/pedestrian measures would make urban centres more pedestrian-friendly by expanding biking and walking lanes, installing bike racks, and improving security. While the reductions are modest (0.3 Mt) and more expensive than the transit measures, such improvements are underway in many cities. These visible alternatives provide important signals to reinforce changing public behaviour.

This package encourages a shift by increasing parking charges in the three major cities of Toronto, Montreal and Vancouver (the measure assumes a $3 to $5 charge on 20 per cent of all commuting trips, primarily in the city centre). Current research, confirmed by the Table's analysis, indicates that parking charges would be a highly effective instrument. This measure would reduce emissions by 0.5 Mt in 2010. Although the cost per tonne is high, this is offset by the revenues generated from the charges.

Higher parking charges in all major urban centres would generate much larger reductions of up to 8 Mt, if a charge of $2 per trip were applied to all commuting trips in all major urban centres. However, the ability to levy parking charges in some private areas, such as outside a factory or mall, needs further investigation. Additional work is needed to be able to target the measure more precisely to daily commuters and to avoid promoting a shift of business away from downtown centres. Consultation is needed with municipal governments, which would have responsibility to implement such a charge. Finally, this measure would require targeted awareness measures to build public support. Still, parking charges represent an area of considerable potential, particularly when combined with measures to promote alternatives such as transit.

FCM proposes that an initial goal for these measures be set at 10 Mt. The Green Municipal Funds would use its resources to invest in feasibility studies and pilot projects focused on eliminating barriers to telecommuting, car sharing, parking pricing and

supply, traffic signal improvements, driver education and transit service improvements, including smart cards.

Recommended investment in these areas in the 2002 federal budget: $10 million for a tripartite total of $30 million).

It should be noted that the FCM 2001 Federal Budget Submission calls for an inter-modal, integrated transportation program separate from Infrastructure Canada funded by revenue equivalent to 3 cents/litre gas tax. The modest investments proposed here could be funded through Transport Canada or through the current transportation category within the Infrastructure Canada program.

6. Community Greening

Urban greening strategies are an important part of municipalities' ongoing community improvement activities. While there is uncertainty around the levels of carbon sequestration that result from community greening and tree-planting strategies, such programs provide multiple benefits to the community:

- Parks cool the microclimate as they provide recreational opportunities, places of aesthetic enjoyment and calm in a busy environment. The air is more humid, cool and refreshing to breathe. Birds and small mammals have a relatively secure home.
- Street trees canopy the road and sidewalks, thereby cooling residential neighbourhoods and in some instances, institutional and commercial places. Trees make an area more appealing, quiet and sheltered from the elements, thus raising the value of the location.
- Private property trees along with street trees protect nearby buildings from the extremes of heat and cold and precipitation (storm run-off), resulting in energy and financial savings to the property owner and the utility provider.
- Natural wooded areas or "naturalized areas" provide greater opportunities for wildlife habitat and when connected provide migration corridors that help increase biodiversity and ecological resilience. In combination with the soil and atmosphere, natural areas recycle nutrients and remove toxic pollutants, particulates and carbon dioxide from the air.

The amount of carbon sequestered varies widely between species and ecosystems; a recent study of the potential for urban forestry to contribute to greenhouse gas mitigation in Toronto estimated that the average urban tree in that city sequesters 37 kilograms per year of carbon, equivalent to 136 kilograms of CO_2. If the *indirect* effect of tree planting to save heating and cooling energy is included then the CO_2 saved ranges from is several times the direct effect, bringing total CO_2 savings per tree into the range of 200 - 800 kilograms per year depending on the local circumstances, climate, species and fuel mix. Major urban tree planting and forestry initiatives can have a significant greenhouse gas mitigation impact, as much as 2 – 4 per cent of the annual greenhouse gas emissions in the community. All trees have to be replaced eventually to maintain carbon sinks, but trees properly planted to take advantage of their energy conservation effects on heating and cooling will avoid CO_2 emissions from *ever* occurring. Urban forestry offers many other positive effects on the quality of life in urban environments and can play a central role in a city's efforts to achieve environmental principles and sustainable development.

With their responsibility for parks, tree planting, green spaces, and land use, municipal governments play a central role in determining changes in the overall carbon flux that occur within their boundaries. While the impact of greening strategies on greenhouse gas mitigation is positive, there are other aspects of municipal government operations that may contribute to a decrease in the community carbon sink. Forested lands, agricultural land, green spaces, and parks are all relatively effective carbon sinks compared to residential and commercial developments and transportation corridors. When municipal governments approve land use changes, they are approving changes in the community carbon sink. There is little reliable data on the quantitative impacts on carbon sequestration of land clearing and rezoning. Further research could determine the importance of urban land use changes to climate change, and to raise awareness among municipal planners of the climate change implications of their decisions.

FCM proposes that resources for community greening available through current programs be increased to support achievement of a target of 1Mt reduction by 2010. FCM is investigating the costs that would be related to such a program.

Conclusion

FCM is proposing a package of measures aimed at securing significant greenhouse gas reductions and improvements to air quality while meeting multiple community goals and improving quality of life.

Summary of investments, reductions and costs

Category	**GHG reductions in 2010 Millions of Tonnes (Mt)**	**Total Cost to Government of Canada (Millions) over five years**
Green Funds	Included in below	$125
PCP/Data	Included below	$0.650
Infrastructure Canada:		
Waste Diversion	3.6 – 10 Mt	$35
Landfill capture/utilization	6.5Mt	$50
Municipal Procurement	1.8 Mt	$75
CES/CHP	3.5 – 10.3Mt	$50
Transportation	10 Mt	$10
Community Greening	1 Mt	To be determined
Total	**40 Mt**	**$345.6**

Investment in 2002 federal budget: $70 million; tripartite total: $210 million. The Green Municipal Funds would cover the cost of feasibility studies for these projects (not covered by Infrastructure Canada) and would invest in innovative, higher-performing technologies to continue to pull the municipal marketplace.