

City of Whitehorse

Corporate Milestone 5 Report: Monitor, verify, and report GHGs

January 2013

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Introduction

Background

The climate in Whitehorse has been changing. It is clear from weather data going back to the 1940s that temperature has been warming, especially in winters. Spring break-up has been arriving earlier, freeze-up occurs later, and the number of frost-free days has been increasing (Hennessey, R. and Streicker, J. 2011). Changes in temperature and precipitation have already resulted in shifts in landscape conditions and may increase the vulnerability of Yukon communities to environmental stresses associated with variable weather, drought, flooding, forest fire, and food and energy security. These environmental stresses also carry implications for northern infrastructure, the health of northern residents, and the economy (ibid.).

In 1995 the City of Whitehorse began the commitment to address climate change, with a council resolution to join the Partners for Climate Protection Program (PCP). The PCP program is a network of Canadian municipal governments that have committed to reducing greenhouse gas emissions and taking action on climate change. Spearheaded by the Federation of Canadian Municipalities in Canada, it is part of an international network of over 900 communities worldwide.

In 2004, the City completed the first three milestones of the PCP program:

1. Profile energy use and emissions from City and community-based sources, and forecast energy use and emissions;
2. Establish reduction targets for City operations and the community; and
3. Develop and finalize a Local Action Plan (LAP) that aims to reduce energy use and emissions.

The LAP contained 26 recommendations for corporate action and 71 community actions to reduce GHGs. Greenhouse gas emissions inventories were compiled for 1990, 1996, 2000 and 2001 for corporate data and 2001 for community data.

Early in 2011 the City submitted milestone four of the PCP program:

4. Implement the LAP.

An update of the 2004 LAP was undertaken to determine the status of the nearly 100 recommended actions. Both corporate and community actions were reviewed, although the City decided to focus monitoring efforts on corporate actions. Community actions and GHG reductions require the participation of a broad array of partners, and wherever possible the City works with local organizations and other orders of government to achieve common goals.

In 2009 the Yukon Government released its Climate Change Action Plan, which focuses on community GHG reduction initiatives and monitoring; it committed to defining Territory-wide targets for reducing GHGs by 2012. Therefore the YG is focusing resources on monitoring community-wide GHG reduction efforts and the City does not want to duplicate efforts.

This report represents the completion of Milestone 5:

5. Monitor, verify, and report GHGs.

2010 Greenhouse Gas Inventory Update

Methodology

Corporate Greenhouse Gas Emissions were calculated for the year 2010 to provide a benchmark for evaluating outcomes from the implementation of the Local Action Plan. The methodology in calculating emissions was consistent with previous inventories that followed the PCP Inventory and Quantification Support Spreadsheet. The version of the spreadsheet used includes emission factors from the National Inventory Report 1990-2010 – Greenhouse Gas Sources and Sinks in Canada. Annex 13 Released on April 11, 2012. Emissions from previous inventories were also updated to those used in the current 2010 inventory to provide a consistent basis for comparison. This inventory is for corporate emissions only, the monitoring of community emissions are the responsibility for the Yukon Government; however, community GHG reduction initiatives lead by the City are described qualitatively in this report.

Corporate emissions were calculated for five sectors identified in the FCM/PCP guidelines: buildings, vehicle fleet, water and wastewater, street lights and waste received at the municipal run landfill. Emission factors shown in Table 1 were applied to energy consumption data from utility and cardlock bills comprising of electricity, diesel, heating oil, vehicle fuel and propane, and historical tipping data from the municipal waste management facility.

Table 1: Emission Factors by Energy Source

Gasoline	2.44	TCO2e/Litre
Diesel	2.68	TCO2e/Litre
heating oil	2.74	TCO2e/Litre
Propane	1.54	TCO2e/Litre
Landfill	48	TCO2e/Tonne
Compost	-22	TCO2e/Tonne
electricity		
1990	0.190	TCO2e/KWh
1996	0.220	TCO2e/KWh
2000	0.060	TCO2e/KWh
2001	0.160	TCO2e/KWh
2010	0.050	TCO2e/KWh

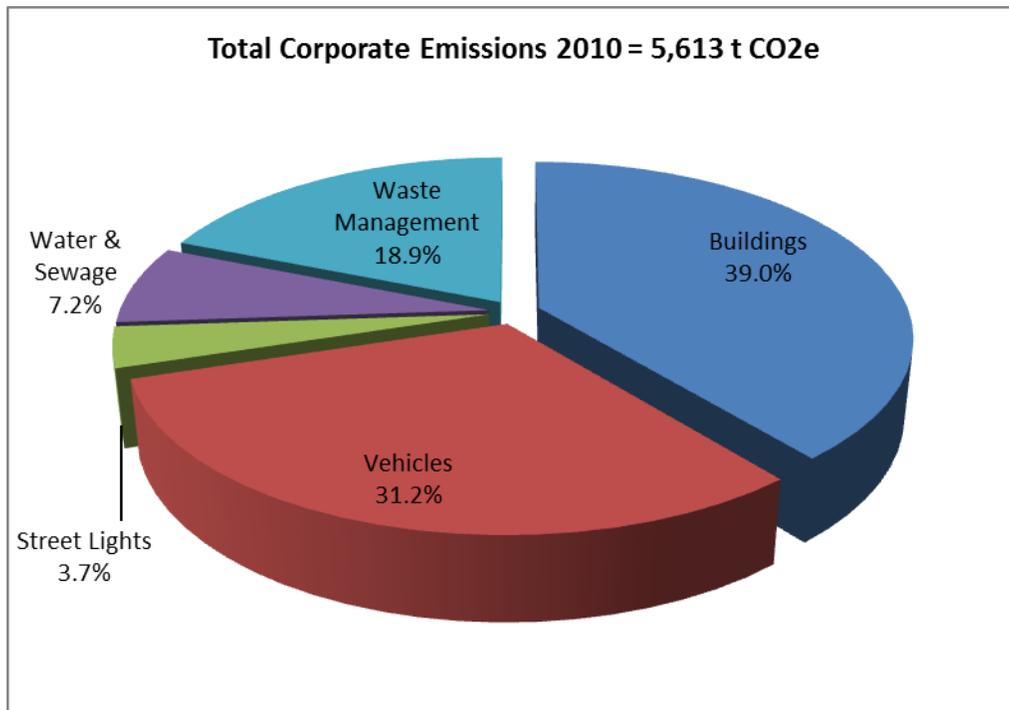
Since the waste management is operated by the City of Whitehorse, emissions from the domestic waste received at the landfill as well as composting are included in the inventory. Since the Whitehorse landfill does not have a methane collection system, actual gas volumes are unavailable. The PCP Inventory Quantification and Support Spreadsheet has universal landfill and compost emission factor coefficients. It is anticipated that emissions based on the decay model methodology described in Greenhouse Gas Sources and Sinks in Canada would likely yield lower landfill emissions due to the relatively drier conditions at the Whitehorse landfill than in the rest of Canada. This requires detailed historical landfill waste quantity and composition data dating back to the opening of the landfill. Data limitations consequently only allows for the universal emission factor from the PCP tool to be applied.

In 2010 the City began working with the utilities to gather energy data. In recent years the utilities have changed their accounting and monitoring systems which has enabled them to provide the City with more accurate and accessible data. This has greatly improved the City's monitoring of energy use, costs, and GHG emissions. Data collected prior to 2010 (i.e. for the inventories in the 2004 Local Action Plan) were collected from the utilities under different systems, and some estimates were required. Therefore comparing GHG emissions for the various years included in the LAP and this report is not exact or precise. However this is the best information available and provides the City with a sense of direction towards a goal. With recent improvements in data collection and monitoring, tracking GHGs emissions in the future will be considerably more rigorous and precise.

2010 Corporate Emissions

In 2010 Whitehorse’s Corporate GHG emissions were calculated to be 5,613 tonnes CO₂e. Figure 1 shows that the building sector is the highest contributor to GHG emissions (37%), followed by City vehicles (30%), waste (18%), street lights (13%), and finally water & sewage (2%).

Figure 1: Whitehorse 2010 Corporate GHG Emissions by Sector



The City’s 2004 Local Action Plan committed to reducing corporate GHG emissions by 20% from baseline 1990 levels by 2013. According to the data available, the City’s GHGs increased by 27% since 1990, an increase of 1,192 CO₂e. This leaves the City unlikely to achieve its targets by 2013. Table 2 shows the GHG emissions per sector for the inventory years and 2010, and the change from the baseline.

Table 2: Corporate GHG emissions by sector and change from baseline

Year	Building	Vehicle Fleet	Street Lights	Water & Sewage	Waste	Total eCO ₂ (T)
1990	1,589	894	287	1,235	416	4,421
1996	1,708	1,169	415	1,518	537	5,347
2000	1,652	1,004	120	524	759	4,060
2001	1,710	1,269	336	930	759	5,003
2010	2,189	1,751	209	404	1061	5,613
Change (2010-1990) TCO _{2e}	600	857	-78	-831	645	1,192
% Change (2010-1990)	38%	96%	-27%	-67%	155%	27%

However, a 27% increase in GHG emissions in 20 years is not proportional to other indicators of growth, which have increased considerably more. In the two decades since the City’s baseline year, the population of Whitehorse increased by 20%, the City’s overall budget is over three times larger, and floor space more than doubled (see Table 3). When the City’s multiplex facility was completed in 2005, it added an additional 32,442 GJ of energy use (from 4,465 GJ at Lions Pool in 1996 to 36,907 GJ at the CGC in 2010).

Table 3: Increase in Population, Budget and Floor Area

	1990	2010	% change
Population	17,925	22,585	20.63
Total Budget	\$28,610,880	\$89,242,780	212
Floor Area (m²)	20,492	48,101	135

The City’s GHGs are dependent upon commercial and industrial activity throughout the Yukon. The number and intensity of mines operating throughout the Territory determines the amount of diesel Yukon Energy Corporation has to utilize – above and beyond hydro generation – to meet electrical demand. In 1990 and 1996 the Faro mine was operating, therefore causing the emissions factor applied to electricity to be much higher than other years. In upcoming years the Yukon may have a number of large mines opening, and unless the utility and its partners

find other renewable sources of energy, diesel will be used and as a consequence the City's GHG emissions will increase.

Table 4: Summary of corporate initiatives

Status	Number	Notes
Completed:	8	Energy upgrades to the multiplex and the City's water and sewer facilities and the purchase of bicycles for staff use are recommendations from the LAP that have been completed.
Ongoing:	7	An increasingly important focus for internal operations monitoring of corporate energy use; an energy monitoring database is being created to facilitate monitoring.
Not started:	14	A number of recommendations were not completed due to resources and changing priorities, including awareness campaigns, the creation of a revolving retrofit fund, and examining alternative fuels for vehicles.

2010 Community Emissions

Greenhouse gas emissions in the community of Whitehorse in 2001 were 0.176 Mt. In some sectors, such as waste management; Transit and active transportation infrastructure; planning and development; and building permitting, zoning, and DCCs, the City can exert a certain amount of influence to change behaviour of residents. A number of projects and programs in these sectors have been undertaken within the last decade, in order to influence residents and visitors to make climate-friendly decisions that reduce GHGs.

Due to the immense challenge of monitoring community-wide GHG emissions, the City has focused monitoring efforts on corporate emissions. The territorial government has focused on territory-wide GHG mitigation efforts, with the release of a Climate Change Action Plan in early 2009, and the development of territory-wide emissions targets (to be released in 2012). The City partners with the Yukon Government Climate Change Secretariat on a number of GHG reducing projects. Partnerships are outlined below.

Table 5: Summary of community initiatives

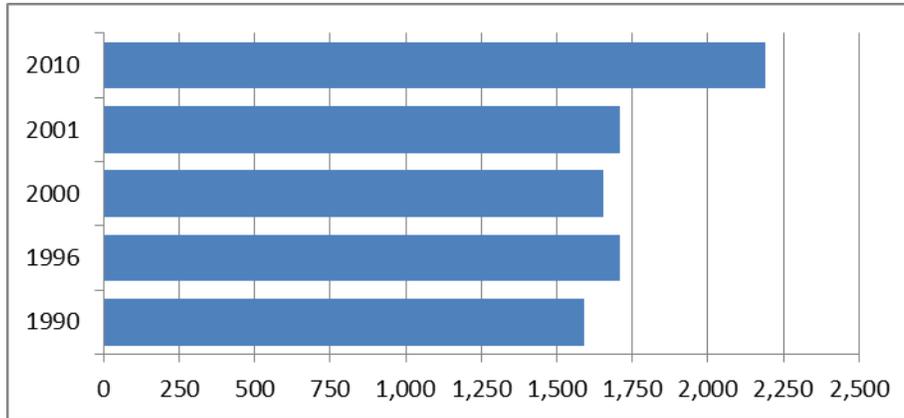
Status	Number	Notes
Completed:	24	Completed recommendations within the direct mandate of the City, such as improving trail infrastructure, improving Transit routes, and integrating minimum energy requirements into the Building and Plumbing Bylaw were completed. Local partners completed other initiatives to reduce energy use; however they are not included in this total.
Ongoing:	6	Ongoing initiatives focus primarily on increased improvements to active transportation programs and infrastructure.
Not started:	41	The majority of recommendations not completed are in the Transportation sector, and include public campaigns, carpooling websites, and the creation of advisory groups.

Corporate Initiatives

City Buildings: 7 Actions

Buildings contribute to the highest share of corporate GHG emissions, at 2,189 TCO₂e in 2010 (see Figure 2). The emissions from this sector include building energy use associated with lighting, heating, equipment, and outdoor vehicle plugs.

Figure 2: GHGs from City Buildings



Overall, the GHG emissions from the building stock have increased 38% over 1990 levels, whereas floor area more than tripled. The overall building GHG intensity in 2010 was 0.045 TCO₂e/m², compared to 0.143 TCO₂e/m² in 1990; a 68% decrease in energy intensity (see Table 6). Energy used by select corporate buildings over the years is shown in Figure 3. While total energy use by buildings has increased primarily due to the increase in building stock, building energy improvements in energy demand reductions and heating degree days 12%¹ lower in 2010 than 1990 have resulted in the lower overall building GHG and energy intensity.

Table 6: Energy Intensity

	2010	1990	% change
Floor area	48,101	11,148	331%
Bldg GHGs	2,189	1,589	38%
Intensity	0.045508409	0.142536778	-68%

Strategies: Reduce energy use in existing buildings & reduce energy use in new City buildings

¹ 7137 HHD in 1990 and 6248 HHD in 2010, Environment Canada

http://climate.weatheroffice.gc.ca/climateData/generate_chart_e.html?timeframe=2&StationID=1617&type=bar&MeasTypeID=heatingdegreedays&cmdB2=Go&Month=12&Year=2010&Day=2

Completed:	CB.3	* See attached spreadsheet for description of strategies and full update
Ongoing:	CB. 2; CB.5	
2012 priority:	CB.1; CB. 6; CB.7	
Not completed:	CB.4	

Over the years, a number of projects have been completed to reduce energy use in City facilities. Lighting upgrades (CB. 2) have occurred in nearly all City buildings; T12s are being removed and replaced with T8s or T5s; all new buildings are being installed with either T5s or LEDs. Preventative maintenance occurs on most processes in City facilities, including regular testing of water/glycol mix of heating systems (CB. 3).

In late 2011, the City's Purchasing and Sales Policy was amended to include Sustainable Procurement. Implementation on this policy has begun; energy efficient IS equipment is one of the first priority areas (CB. 6). All lap tops, desktops, and most servers and other equipment are Energy Star certified, and more opportunities are currently being examined to reduce energy use of equipment.

Figure 3 (below) demonstrates that energy use in most City buildings either remained constant or increased. In three buildings – Mount McIntyre Recreation Centre, Takhini Arena, and City Hall/Fire Hall #1 – energy use decreased. In all three facilities, electrical use decreased, likely due to upgrades to lighting systems. In Takhini Arena and City Hall/Fire Hall #1 energy use in space heating decreased, likely due to more efficient boilers.

Highlighted Action: Support Recommendations in Energy Audit for Phase 2 of Multiplex (CB.6)

In 2005 construction of the Canada Games Centre was completed. This 21,696m² facility was not in operation when the Local Action Plan was completed in 2004, and therefore not included in previous inventories. Now it is the City's main indoor recreation centre, and Whitehorse's biggest energy user. Therefore a number of energy conservation measures have been implemented to reduce the use of fossil fuels. Waste heat from the ice-making process was utilized to supplement heating of the lap pool and to pre-heat incoming air entering the soccer arena.

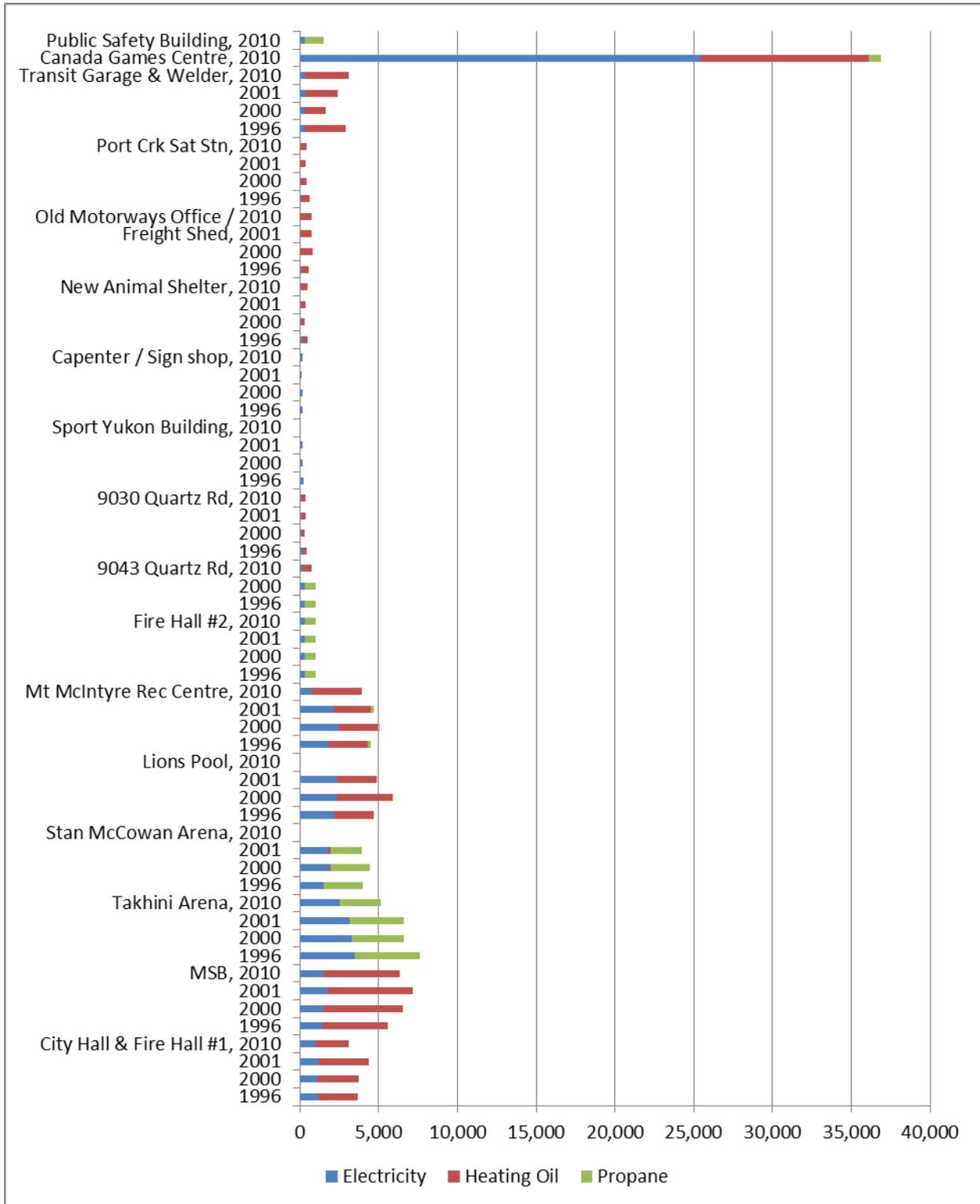
In 2010, further energy conservation measures were initiated, thanks to funding from the Municipal Rural Infrastructure Fund, Gas Tax, and the City. This project aims to identify energy upgrades, improve energy management, and implement key energy infrastructure upgrades, including:

- Energy model reconciliation;
- A lighting assessment;

- Improve HVAC system controls;
- Air system modifications in an air handling unit; and
- Utilizing more waste heat from the ice-making process to pre-heat domestic hot water.

It is expected that these infrastructure and process upgrades will reduce the use of electricity (by ensuring adequate lighting levels and control optimization) and fossil fuels (by reducing the amount of diesel used for space heating and DHW heating).

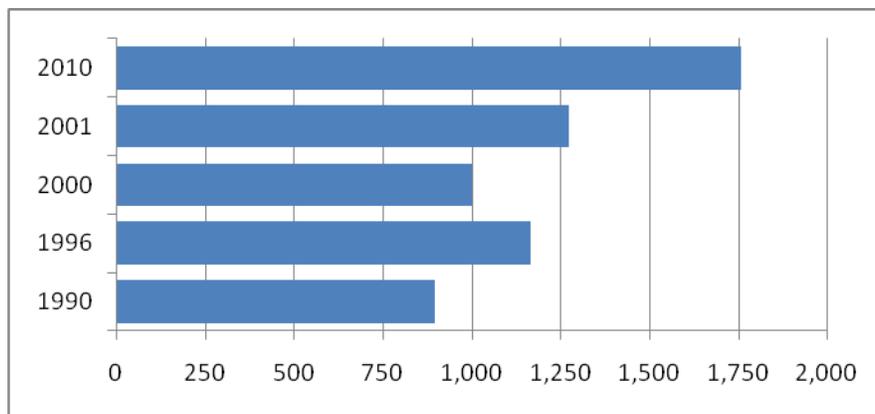
Figure 3: Energy use by building and fuel source (GJ)



Vehicle Fleet: 4 Actions

Vehicles contribute the second highest share of corporate GHG emissions, emitting 1,751 TCO₂e in 2010 (see Figure 4). Emissions from this sector are based on gasoline and diesel purchased from city cardlock accounts which includes all of the City’s vehicle fleet including trucks, cars, maintenance vehicles and equipment such as snowplows, landscaping equipment and city owned heavy equipment, but excludes transit vehicles. Figure 4 shows that GHG emissions from the vehicle fleet have almost doubled over 1990 levels.

Figure 4: GHG emissions from City vehicle fleet



Strategies: Reduce emissions from fleet vehicles & reduce the need for fleet vehicles

Completed: VF. 2, VF. 4

** See attached spreadsheet for description of strategies and full update*

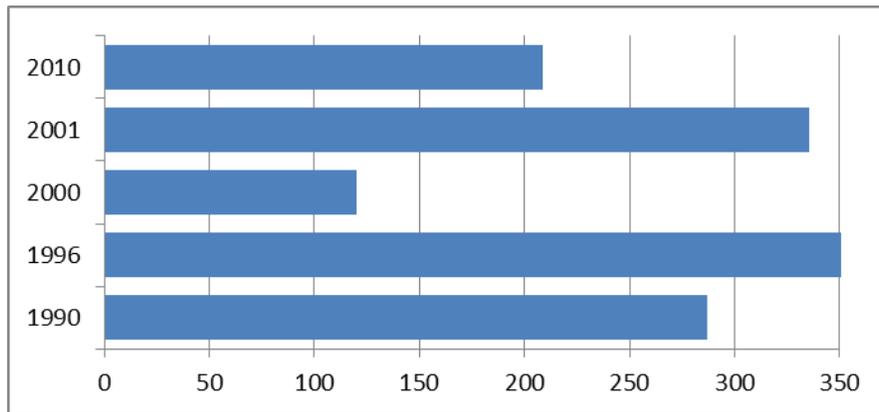
Not completed: VF.1; VF. 3

Some of the largest challenges the City has encountered in its efforts to reduce GHGs have been in the transportation sector. Some programs were introduced to attempt to decrease fleet vehicle fuel consumption; however growth in the fleet has negated any GHG reduction that may have occurred. In 2004, four bicycles were purchased for City staff (action VF. 4) in order to reduce the use of vehicles. They are maintained by a local bike mechanic, and used in the summer months by staff in downtown Whitehorse. An electric bicycle may be purchased in 2012 to encourage longer commutes outside of the downtown area (which involves climbing a big hill). Encouraging the use of City bicycles requires sustained internal marketing and continuous maintenance. This initiative was combined with offering City staff a 50% discount on City bus passes, which resulted in a small increase in purchase of passes.

Street Lights

In 2010, street lights were responsible for 209 tCO₂e, or 3.7% of the City’s GHG emissions. Since 1990, energy use by street lights increased by 64% while GHG emissions decreased by 27%. Streetlights are powered exclusively by electricity; therefore they are highly dependent upon the electrical emissions factor. Since 1990, the emissions factor has decreased by 73%; GHG emissions for street lights have not decreased by the same amount because of growth in the City which results in additional street lights.

Figure 5: GHG emissions from Street Lights

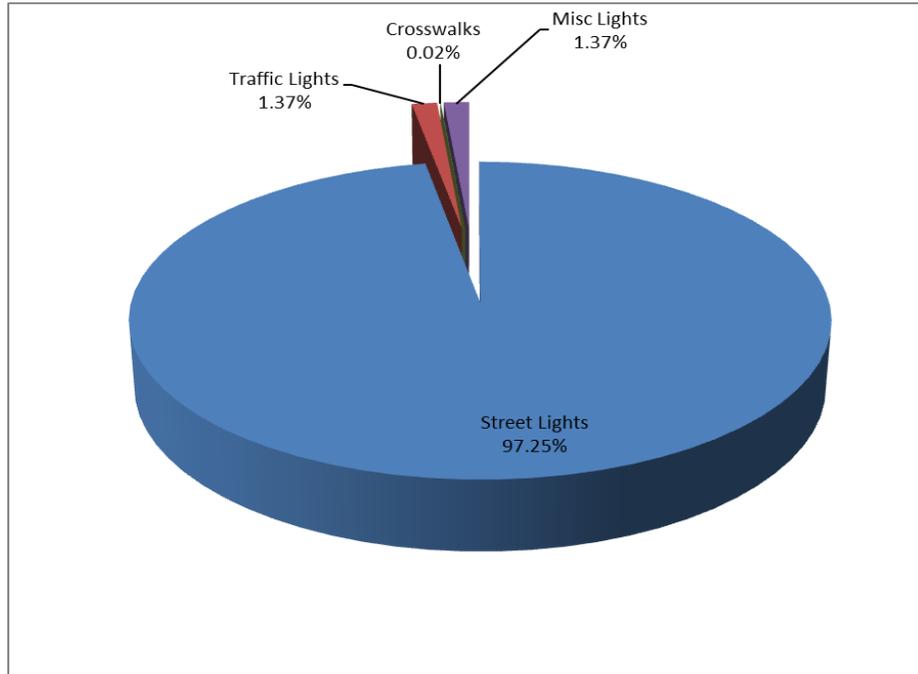


There were no recommended actions for the street lights sector in the City’s 2004 LAP. Most street lights in Whitehorse are not metered, and are owned, operated, and maintained by Yukon Electrical Corporation Limited (YECL, an ATCO company). The City pays a flat fee per light that includes all these costs. This fee structure leaves little incentive for either YECL or the City to make energy saving changes to street lights. The City does own some street lights, including traffic lights, crosswalks, and heritage lights; in these cases conversion to LED lights has occurred where possible.

Recently YECL, Yukon Energy Corporation, and the City undertook a small number of pilot projects on converting street lights to LEDs. Initial results of these pilots are promising. While there are no concrete plans for a large scale conversion of street lights to LEDs, it is a topic that is gaining momentum.

Figure 6 shows the energy and GHG emissions per sector for street lights for 2010. Since street lights are powered exclusively by electricity, the percentage of energy and GHGs used are the same.

Figure 6: Distribution of Energy and GHG Emissions (TCO2e) from Street Lights 2010

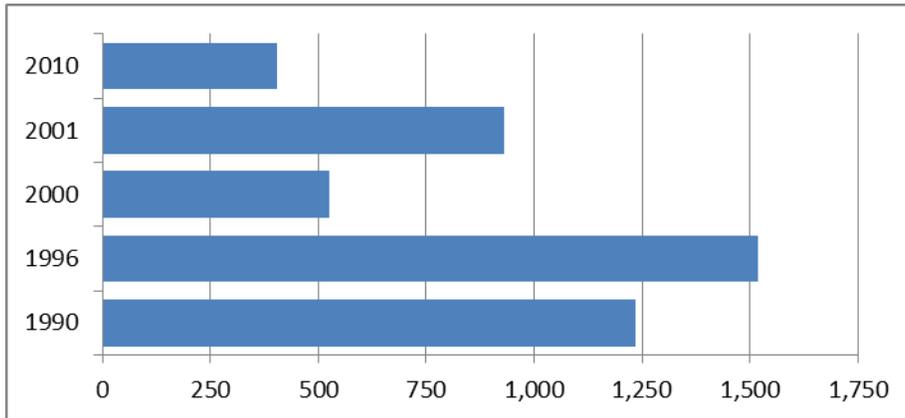


Water & Sewage: 10 Actions

The water and sewage infrastructure emitted 404 tCO₂e in 2010 or 7.2% of total corporate GHG emissions. The water and sewer infrastructure includes the water and sewage transmission system, and storm water system.

Due to a number of initiatives over the past two decades, greenhouse gas emissions from the water and sewer systems have experienced the most dramatic decreases of any sector (see Figure 7). In previous decades, the City's water source was Schwatka Lake: surface water that had to be heated continually to prevent pipes from freezing. Over the past two decades the City has built a number of new wells and transitioned to ground water; the transition was completed in 2009 when all of the City's water was drawn from ground water. Ground water is considerably warmer and does not require pre-heating. According to the former Manager of Public Works, the City used to have a 5000 gallon tank that was used to pre-heat the water running through the water system; eventually this was converted to a 250 gallon tank. Most pumphouses still have large fuel tanks and furnaces to heat the water; however they haven't been turned on (except for maintenance) in nearly a decade.

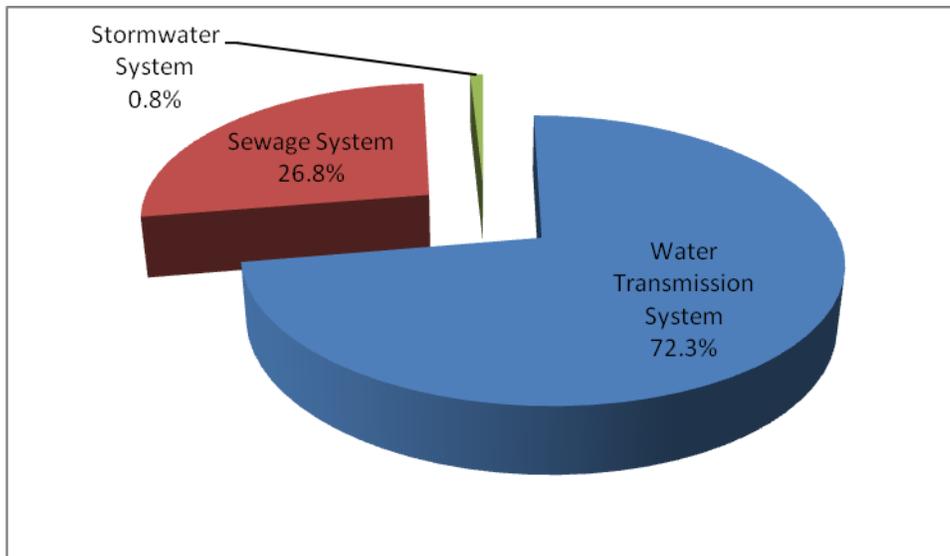
Figure 7: GHG Emissions from Water and Sewer infrastructure (TCO₂e)



Furthermore, in 1998 an energy audit was completed on the City’s water and sewer system. This led to a number of measures to improve energy management, such as optimizing control and system operations. Fuel switching has also occurred, as oil boilers at a number of pumphouses were converted to electrical boilers, which would also contribute to a reduction in fossil fuel use and an increase in electrical use.

Due to these measures, and fluctuating electricity emissions factors, GHG emissions from water and sewage infrastructure are nearly four times (-375%) lower for 2010 than 1990 while energy use has decreased by 3%. Energy use decreased in 2000 and 2001, and appears to be increasing: since 2001 energy use increased by 12%. Figure 8 shows that energy consumption is dominated by the water transmission system.

Figure 8: Water and sewer infrastructure energy use by sector 2010



Figures 9 and 10 below compare GHGs and energy use per year for each sector. These two figures demonstrate that GHGs reflect fluctuating emissions factor for electricity, while energy use is more stable.

Figure 9: GHG Emissions by Sector 1996-2010

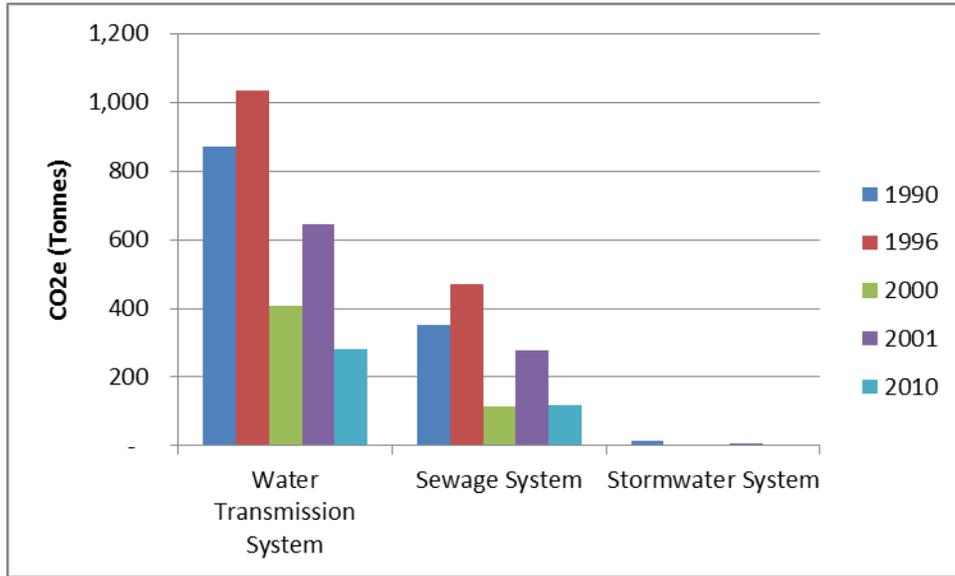
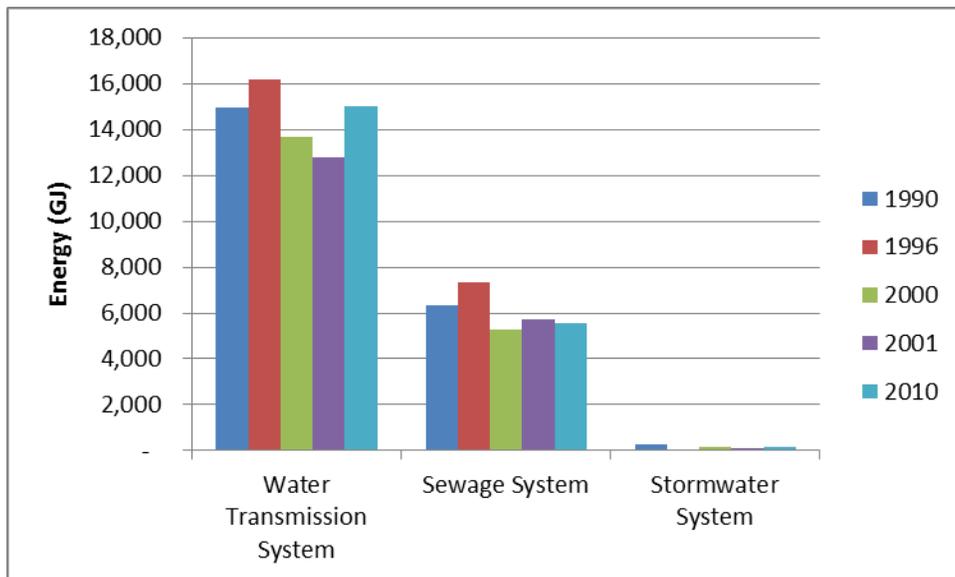


Figure 10: Energy Use by Sector 1996-2010



Strategies: Reduce pumping volumes & increase energy efficiency of new and existing facilities

Completed:	WS. 3, WS. 5, WS. 6, WS. 9	<i>* See attached spreadsheet for</i>
2012 priority:	WS. 1, WS. 7	<i>description of strategies and full update</i>
Not completed:	WS. 2, WS. 4, WS. 8, WS. 10	

Proper maintenance and energy reduction efforts for water and sewer infrastructure have multiple benefits, including water conservation, reducing energy consumption, and reducing or delaying the need for expensive new infrastructure.

Since the City's Local Action Plan was completed, a number of changes have occurred in the City's water and sewer infrastructure. In late 2009 the City transitioned from surface water to ground water, with the construction of several new wells (WS. 6). This change eliminated the need to utilize expensive treatment systems to eliminate pathogens of surface water, as well as dramatically reducing the need to heat water in the distribution system to avoid freezing. Upgrades to Lift Station #1 pumps were completed to improve pumping efficiency; main replacements have been done as part of capital projects; injection sealing has occurred at the outfall pipe; and exfiltration systems have been installed in a number of locations (WS. 5).

In 2003 the City commissioned a Water and Sewer Study (WS. 9). This study, among other objectives, evaluated the capacities of the system, identified deficiencies, determined existing demand and flow, and prepared a staged implementation plan for both the water and sewer systems in the short, medium, and long terms. This information is consistently reviewed, and steps are taken to implement the recommendations as appropriate.

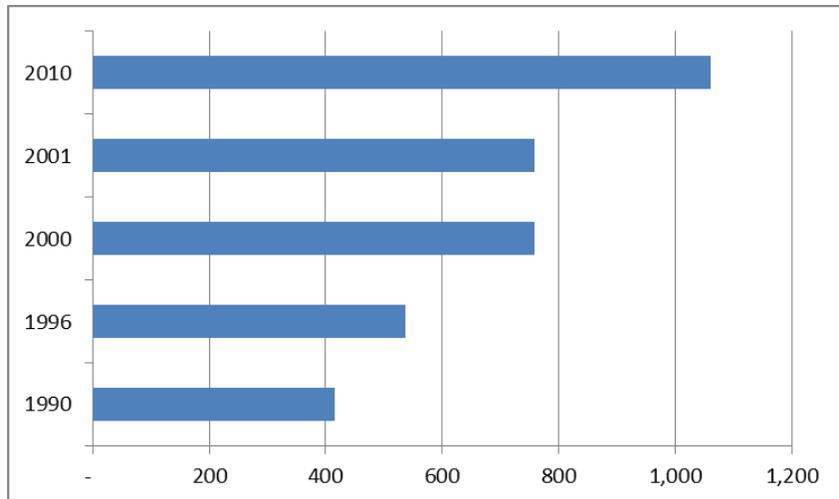
In late 2011 a project was initiated with Gas Tax funding to undertake further research on the installation of residential water meters throughout the City (WS. 1). Water meters provide an incentive for water conservation and reduce energy and operating costs by lowering pumping volumes and water treatment needs. This project will focus on the impact of implementing a water metering system on: the City's water distribution infrastructure; on water use by residential properties; on billing and financial processes; and on residential properties and commercial businesses. It will also include technical investigations and consultations to identify appropriate technology, system design, and installation procedures.

Waste Management: 3 Actions

Completed: 0 ** See attached spreadsheet for description of strategies and full update*
 Ongoing: W. 2
 Not completed: W. 1, W. 3

In 2010, waste was responsible for 19% of the City’s GHG emissions, at 1,061 tonnes of CO₂e; a 155% increase since 1990 (see Figure 11). Such a significant increase is likely due to the increase in construction and demolition waste entering the landfill, as well as population growth and the increase of waste due to packaging and our modern lifestyle.

Figure 11: GHG emissions from Waste Management Sector 1996-2010 (CO₂e)



While none of the corporate actions on waste management from the LAP have been completed, waste management has been a significant priority and focus for the City over the past decade. Internal City operations have benefitted from the upgrades and additions at the City’s waste management facility. Compost and recycling bins are now in place in most City facilities, and arrangements have been made with janitorial staff to empty compost bins. For more information on waste management, see the waste management section under Community Recommendations.

City Monitoring and Reporting: 5 Actions

Completed: 0 ** See attached spreadsheet for description of strategies and full update*
 Ongoing: M. 2, M. 3, M. 4
 Not completed: M. 1, M. 5

Since 2010 monitoring of City energy usage has become an increasingly important priority. In 2011 an analysis of 12 years of City energy usage was completed, with data from the City’s

financial system. In the same year, work began on a central energy database (M. 2), using data gathered from energy suppliers. It is expected to be completely populated with training for staff by fall 2012. The database will include fuel consumption & efficiency (M. 3) in fleet vehicles, as well as documenting, measuring and comparing reduction efforts (M. 4).

Community Initiatives

The 2004 Local Action Plan found that 98.1% of GHG emission levels in the City of Whitehorse were derived from community-based sources. Targeting a reduction in community-based emissions would have the greatest benefit; however these emissions are more challenging to address and monitor. The City can have an impact on these emissions through three main avenues: policy actions, operational changes, and educational programs. Many community-based emissions will only be reduced by developing partnerships and working with other organizations.

Monitoring the impact of community-based emissions is beyond the scope and ability of the City to undertake, given current resource levels. Instead the City monitors programs, policies and actions in a qualitative way on an annual basis, and nurtures active working relationships with our local (and non-local) partners.

Residential Buildings: 14 Actions	
Completed:	R. 1, R. 5, R. 6, R. 7
Not completed:	R. 2, R. 3, R. 4, R. 8, R. 9, R. 10, R. 11, R. 12, R. 13, R. 14
Institutional & Commercial Buildings: 5 Actions	
Completed:	C. 1
Not completed:	C. 2, C. 3, C. 4, C. 5
Transportation: 37 Actions	
Completed:	T. 5, T. 6, T. 7, T. 10, T. 12, T. 14, T. 17, T. 18, T. 19, T. 21, T. 25, T. 26, T. 29, T. 34
Ongoing:	T. 1, T. 3, T. 15, T. 27, T. 28
Not completed:	T. 2, T. 4, T. 8, T. 9, T. 11, T. 13, T. 16, T. 20, T. 22, T. 23, T. 24, T. 30, T. 31, T. 32, T. 33, T. 35, T. 36, T. 37
Land Use Sector: 12 Actions	
Completed:	LU. 1, LU. 3, LU. 4, LU. 5, LU. 9
Ongoing:	LU. 10
Not completed:	LU. 2, LU. 6, LU. 7, LU. 8, LU. 11, LU. 12
Waste: 3 Actions	
Not completed:	W. 1, W. 2, W. 3

The City has had a number of significant successes in environmental and GHG reducing initiatives since the Local Action Plan was completed. A number of these initiatives are described below.

Buildings (Residential & Commercial)

In September 2009, amendments were made to the City's Building and Plumbing Bylaw. The goal was to increase energy efficiency requirements in all new construction. The new standard is equivalent to the EnerGuide 80 rating, and includes requirements for: an increased minimum thermal insulation; heat recovery ventilators (HRV); and a "blower door" test to ensure minimal heat loss.

To facilitate understanding of and adherence to the 2009 Bylaw – and to provide home purchasers with an assurance of the energy standards – a "Green Building" sticker was designed to be installed in the furnace area of all new homes (see Figure 12). The sticker features a checklist of the new requirements and additionally displays the EnerGuide rating for homes that have been modeled through the EnerGuide program.

Drafting of the Bylaw involved considerable engagement with local partners and developers. The process was helpful in mitigating resistance to the amendments, which was minimal. Initial monitoring of homes built to the 2009 standards suggests considerable cost savings for homeowners and a reduction in GHG emissions. For instance, a new oil forced-air heated home built to the 2009 standards emits 25% less (or 1.6 tonnes of CO₂e/year) than average homes built prior to the 2009 Bylaw.

In summer 2012 further amendments to the Building and Plumbing Bylaw were adopted, including increased requirements for windows, the blower door test, installation of HRVs, and more. These amendments will be implemented at the end of 2012. A further requirement for energy labeling on all new homes will be implemented in September 2013.

Figure 12: Green building standard sticker

Whitehorse
THE WILDERNESS CITY

Thermal and Ventilation Ratings:
Values indicated at time of inspection. Report available at
Planning and Development Services, 4210 Fourth Ave.

Address: _____

Sticker #: _____

MEETS OR EXCEEDS INSULATION VALUE OF:

Walls: including foundations above and below grade	Min. RSI 4.9 (R28)	<input type="checkbox"/> Yes
Ceilings: throughout	Min. RSI 8.8 (R50)	<input type="checkbox"/> Yes
Floors: above unheated spaces	Min. RSI 4.9 (R28)	<input type="checkbox"/> Yes
Slabs: on ground	Min. RSI 1.8 (R10)	<input type="checkbox"/> Yes
Slabs: on ground containing radiant heat	Min. RSI 3.5 (R20)	<input type="checkbox"/> Yes
Concealed floor or crawl space: from grade	Min. RSI 1.8 (R10)	<input type="checkbox"/> Yes
Doors: excluding glazing	Min. RSI 2.1 (R12)	<input type="checkbox"/> Yes
Windows: including glazing	Min. 1.6W/m-K (R3.6)	<input type="checkbox"/> Yes
Insulation: installed around perimeter	Min. RSI 1.8 (R10)	<input type="checkbox"/> Yes
Heat recovery ventilators: as principal ventilation fan	Min. recovery efficiency 64% @ -25°C	<input type="checkbox"/> Yes
Building envelope: blower-door test	Max. 1.5 air changes/hr @ 50 Pa OR Max. normalized leakage area 0.7cm ² /m ²	<input type="checkbox"/> Yes <input type="checkbox"/> Yes
EnerGuide Rating: if modelled		R: _____

Inspector: _____ Date: _____

Transportation

In July 2011 route changes to the City’s Transit system were implemented, following 6 years of research, consultation and design. The new routes:

- Use consistent clock-face scheduling², making the schedule easier to remember;
- Link two (or more) neighbourhoods, reducing the need for transfers;
- All go down Second Ave, which is a more central place downtown and means riders can get downtown without a transfer; and
- Has consistent service throughout the day (no gaps in the middle of the day).

To coincide with the introduction of the changes to the Transit routes, a Transit marketing campaign was launched. The campaign involved social marketing techniques, discounts and coupons at local businesses, Transit ambassadors promoting Transit on the buses, a facebook page, and traditional advertising such as posters.

Ridership increased 25% in the five months (July – November) following the route changes. This is a significant increase, considering these are generally the months with the lowest ridership.

² Buses always arrive at stops at a certain number of minutes past the hour. For instance, arriving at 6:22, 7:22, 8:22, etc.

In 2004 the Smartdriver program (action VF. 2) was held to educate Transit drivers on safe and efficient driving techniques in a manner which conserves energy and maintains equipment. One Transit employee is currently being trained as a trainer of the Smartdriver program in order to have internal capacity for training available for employees.

Land Use

Emphasis in City planning has shifted in the last decade to focus on increased residential density. The 2010 Official Community Plan (OCP) identifies the Urban Containment Boundary (UCB) of Whitehorse, which marks the extent of existing municipal infrastructure and services. The OCP prioritizes this area for new development and encourages infill.

By restricting growth to the UCB, the City is able to limit urban sprawl, increase the viability of public transit, encourage active transportation with more “walkable” neighbourhoods through compact design, and reduce operation and maintenance costs by servicing more people per unit of infrastructure.

The City is in the process of rewriting Zoning Bylaw to reflect the values captured in the OCP. Several changes have already been adopted by City Council, which include the relaxation of building height requirements, and allowing for secondary suites, community gardens, multifamily development, and supportive housing in more residential zones across the city. The City is also exploring opportunities for increasing building heights in the Downtown area and allowing urban chickens in residential zones.

The City also adopted a development incentives policy that encourages development within the UCB to encourage multiple family or supportive housing, mixed use development in commercial zones, mixed use development, rental housing, amongst others.

Waste

Whitehorse residents have been composting since 2002, but the composting program received a significant boost in 2009 when new compost (green) and garbage (black) bins were introduced to all single family households. Diversion from the landfill has consistently increased due to the City’s compost program, as demonstrated in Figure 13.

In summer 2009 and winter 2010 waste composition audits were completed for solid waste landfilled at the Whitehorse solid waste facility. Waste was grouped into 60 categories and four sectors: curbside (collected by City crews), industrial-commercial-institutional, construction and demolition, and communities outside Whitehorse. This compositional data will allow Whitehorse to better plan and target waste diversion programs and initiatives to reach the

City's goal of zero waste by 2040. It was found that 31% of waste currently being landfilled has high diversion potential.

In summer 2012 a waste coordinator was hired at the City to focus on drafting and implementing a Solid Waste Action Plan (SWAP). The SWAP will guide the City to reducing waste by 50% by 2015.

No movement has been made to improve the free store facilities (W. 3); and minimal movement has been made on improving waste management options for decommissioning of buildings (W. 1). However, the SWAP will focus on the ICI and construction & demolition sectors.

Figure 13: Waste collected from City curbside: landfill vs. compost

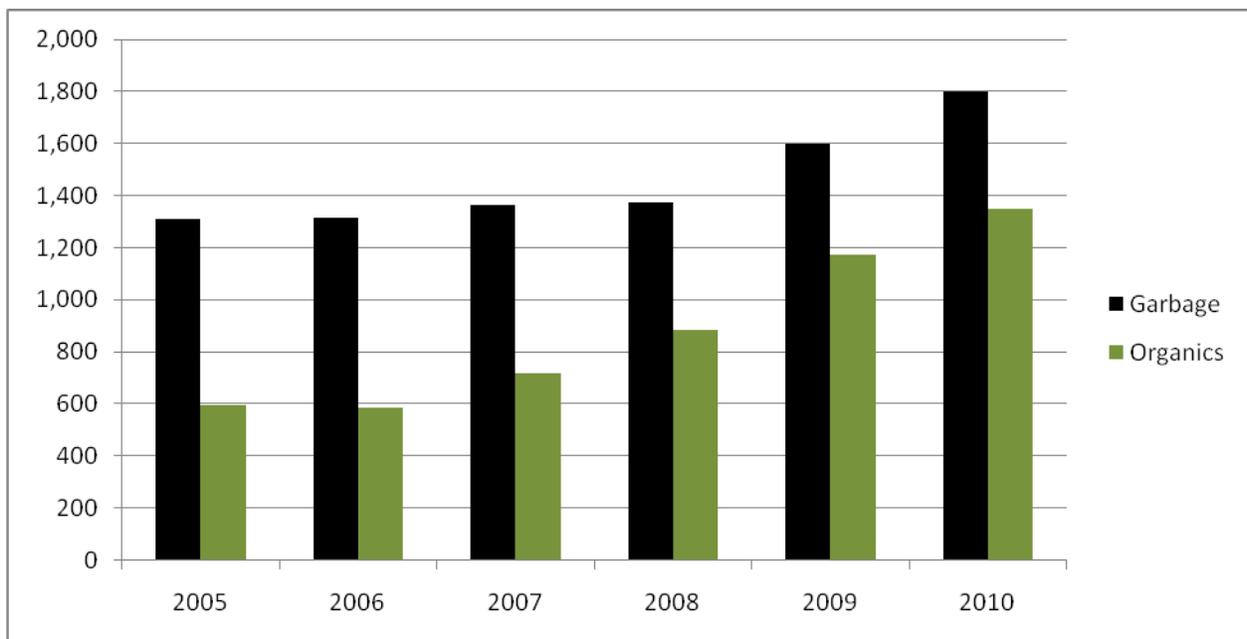
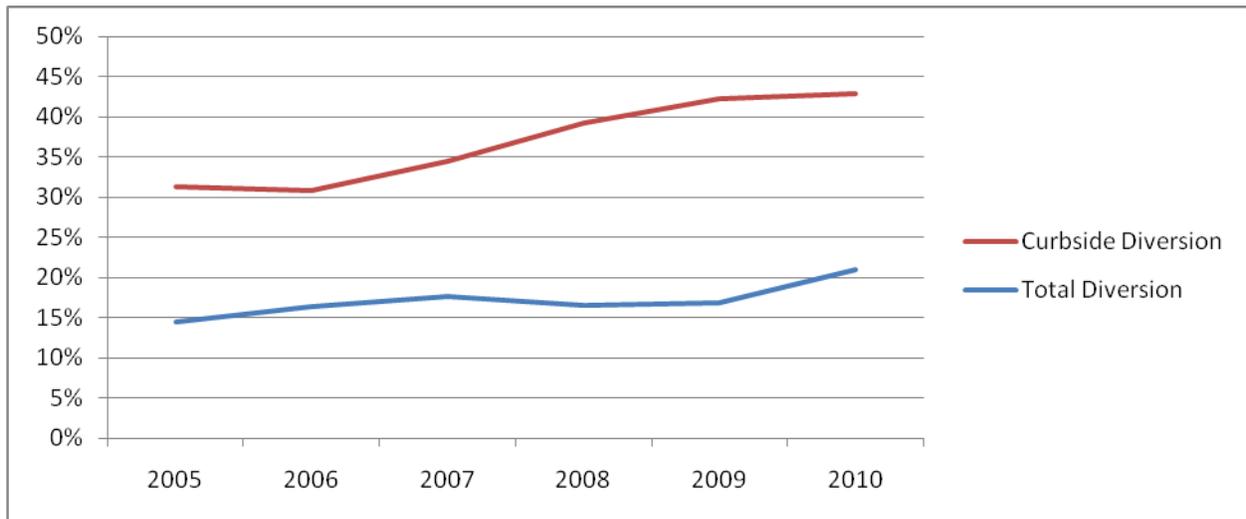


Figure 14: Curbside and total diversion



Partnerships & Engagement

With the completion of the Local Action Plan in 2004, the City made a commitment to continue to engage the public, City partners, and local stakeholders in the implementation of the LAP. This commitment was confirmed with the creation of the Strategic Sustainability Plan (SSP), which was adopted by Council in 2008. The SSP is the City's over-arching document, and was incorporated into the 2010 Official Community Plan. Both plans involved considerable public engagement, including dozens of open houses, a number of community cafes, and a three day Charrette for the development of the SSP. Completing the PCP program, monitoring GHG emissions, and reducing energy use are all objectives listed in the SSP.

A number of important working partnerships exist with local organizations, orders of government, and stakeholders, in order to advance the City's and the community's climate change mitigation and sustainability targets. Examples of key partnerships include:

- The Yukon Energy Partners (YEP): this group consists of representations from various organizations that work on energy-related issues and meets quarterly to discuss projects and opportunities for collaboration.
- The YG Yukon Housing Corporation: provides regular input into the development of Bylaws, zoning, and residential energy initiatives.
- The Yukon Energy Corporation: consistently works with the City to support and promote energy conservation and provided partial funding for the City's Energy Plan (completion expected in fall 2012).

- The Yukon Intergovernmental Committee on Environmental Sustainability: a group of representatives from three orders of government that work together to advance sustainable purchasing and other environmental initiatives.
- The Recreation and Parks Association: collaborates on common projects with the City's Parks and Recreation Department.
- The Solid Waste Committee: consists of City, YG, and local stakeholders that meet regularly to increase waste diversion in the Territory.

Due to the immensity and complexity of confronting climate change, the City will continue to actively engage its local partners and committees in order to most effectively implement programs within the community.

Next Steps

The completion of Milestone 5 and the Partners for Climate Protection Program is not an end in itself, but instead a transition to renewed GHG reduction efforts. Following the completion of the LAP in 2004, the City turned its attention to developing the Strategic Sustainability Plan (adopted four years later). The SSP contains over 50 sustainability objectives the City aims to attain in the seven years following its adoption; a number of these objectives are related to reducing energy use, promoting climate-friendly behaviour in residents, and improving monitoring and reporting. The SSP is a comprehensive document that has been guiding the City's sustainability efforts for the past four years.

It is only recently that resources and data availability have enabled the City to create an energy monitoring program. Once the energy monitoring database is completed in late 2012, accurate monitoring of GHG emissions, units of energy used for all fuel types, and energy expenses, will be possible on a monthly basis. Only through detailed energy monitoring will the City be able to identify accurate results of energy upgrades, and estimate the benefits of future upgrades.

An energy plan, consisting of energy audits on a number of City facilities, will be completed in October 2012. A Solid Waste Action Plan is currently being created, and a Fleet Management Strategy is proposed for 2013. Together, these plans will be combined to guide the City's future energy and GHG reduction efforts.

Unfortunately the targets identified in the 2004 LAP have not been attained. However, with the completion of the energy monitoring program and the corporate energy plan, the City will be in

a place to re-examine those targets, assess why they were not achieved, and identify new targets, as well as an achievable and ambitious plan for achieving them.

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