

Item 7.4
Public Works Committee
May 22, 2014



Hamilton
Public Works

Public Works
Transportation Division
Corporate Assets & Strategic Planning
Division

**2014 Transit Capital Fleet Replacement and
Compressed Natural Gas (CNG) Station
Replacement (PW12017b)(City Wide)**

(Supplemental Information)

Providing services that bring our City to life !

Supplemental Information

- Fuel cost savings
- 40' bus vs 60' bus cost comparison
- Passenger pass-bys
- Proposed route assignments of 60' buses
- Barton stop adjustments for 60' bus usage
- MTC CNG station users
- CNG station cost
- CNG station ownership

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→ Processes
→ Finance



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October 2007
Slide 2

Fuel Comparison – CNG versus Diesel

Fuel Comparison – CNG versus Diesel	
Number of Buses	35
Total Km's for 2 years	4,900,000
Est. M ³ CNG	3,763,200
Est. \$ CNG	\$978,400
Est. Ltrs/Diesel	2,722,200
Est. \$ Diesel	\$2,940,000
CNG vs. Diesel Difference	-\$1,961,600

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40' versus 60' All In Cost Comparison

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Cost Categories		60' Bus	40' Bus	Better is + Worse is - vs 60' Bus	40' Bus With Equivalent 60' Bus Capacity	Better is + Worse is - vs 60' Bus
Section A	Capital Cost	\$861,000	\$553,000	36%	\$815,675	5%
	Replacement Capital Cost per Hour	\$ 17.08	\$ 10.97		\$ 16.18	
Section B	Wage & Benefits Cost per Hour	\$ 36.00	\$ 36.00	0%	\$ 53.10	-48%
Section C	Mtce "All In" Cost per Hour	\$ 26.80	\$ 18.60	31%	\$ 27.44	-2%
Total Cost per Hour		\$ 79.88	\$ 65.57	18%	\$ 96.72	-21%

Pass-by's – September-December 2013

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Routes	Pass By Wheelchairs	Pass By Full	Total
King / Main / Queenston Corridor Rtes 01 / 05 / 10 / 51	502	3039	3541
Barton Corridor Rte 02	373	776	1149
James Mtn Rd / Mohawk College Corridor Rtes 20 / 21 / 33 / 35	35	731	766
Jolley Cut Corridor Rtes 22 / 23 / 24 / 25 / 26 / 27	144	423	567
All Other Routes	30	245	275
Grand Total	1084	5214	6298

Proposed Route Assignments

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Day of Week and Route Assignments		Current			Proposed		
		25' Bus	40' Bus	60' Bus	25' Bus	40' Bus	60' Bus
Wkdy	01 - King		17	0		9	8
	02 - Barton		15	0		8	7
	10 / 55 / 58 - B-Line / St. Cr.		2	11		0	13
	27 / 35 - Upper James / College		7	3		7	3
	51 - University			8			8
	Various Routes	4	117		4	117	
	Total Assigned	4	158	22	4	141	39
Sat	01 - King		4	7		0	11
	02 - Barton		12	0		6	6
	25 / 26 - Upper Went. / Well.			6			6
	27 - Upper James			4			4
	51 - University			3			3
	Various Routes		67			67	
	Total Assigned		83	20		73	30
Sun	01 - King			9		0	9
	02 - Barton		8	0		4	4
	25 / 26 - Upper Went. / Well.			4			4
	27 - Upper James			2			2
	Various Routes		50			50	
	Total Assigned		58	15		54	19
Total Fleet		5	189	25	5	171	43

Articulated Bus Stop Preparations

Route 2 - Barton

Total bus stops	108
Bus stops requiring changes	56

Bus stop change details	
Change	Number of stops
Additional concrete landing pad	22
Parking meter removal	8
No stopping regulation	14
Stop marker repositioning	22
Shelter repositioning	5
Litter container repositioning	3
Street tree repositioning	7
Driveway approach modification	2
Curb bump-out modification	4

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CNG Station at Transit (Background)

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- This existing Compressed Natural Gas (CNG) station at the Mountain Transit Centre (MTC) was constructed in 1984.
- Reliability at the existing CNG station is an increasing concern.
- Major replacement components no longer exist and require custom made parts.
- Existing station maintenance is under a single source contract (PW12017). There are no viable alternatives.
- The station asset is well beyond the expected life.
- A new CNG station is recommended to ensure service reliability, reduce risk and manage costs.

Union Gas Limited

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- Union Gas Limited is a major Canadian natural gas storage, transmission and distribution company based in Ontario with over 100 years of experience and service to customers. The distribution business serves about 1.4 million residential, commercial and industrial customers in more than 400 communities across northern, south western and eastern Ontario.
- Union Gas are the experts in all aspects of the business of natural gas markets they have proven to be a solid partner when working on innovative solutions.
- The City of Hamilton is the largest municipality within Union's franchise territory.

Partnering with Union Gas (Background)

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- The City & Union Gas Ltd. (Union) partnered on original CNG station built in 1984 at the MTC.
- A Letter of Intent and a MOU was executed between Union and the City for the design/build/maintenance of a new CNG station at the MTC.
- Staff recommended that the CNG station be fully owned by Union Gas vs. the City.
- Union would be the General Contractor managing the compressor selection and construction through their competitive bid process.
- With Union's involvement the stations reliability will be enhanced with continuous monitoring for failure.
- Maintenance and capital costs would be recovered by Union through its rates. The new CNG Station essentially becomes an extension of Union's natural gas distribution system.

Partnering with Union Gas (Background)

- Trust and a proven track record in working with the City.
- The City works collaboratively with Union in several areas including:
 - The successful methane gas capture program at the Hamilton Water - Biogas Purification Unit.
 - Several successful energy conservation projects implemented in City owned facilities which included financial incentives from Union.
- Union currently owns and operates 19 compressor stations for the purposes of natural gas storage and transmission. The largest station has 8 individual compressor plants with a total site horsepower (HP) of almost 250,000. In contrast the CNG Station at MTC would be about 1,200 HP.

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Partnering with Union Gas (Background)

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- A request for Information (RFI) was issued by the City to determine the market capability to replace the CNG station at Transit.
- The market is diverse and complicated. Station sizing, construction planning and capital costs are varied and difficult to navigate.
- Staff discussed the feasibility of the City issuing an RFP for the CNG Station. Concerns expressed around construction timing, costs and in-house expertise.
- To bring clarity, staff entered into discussions with Union on station design, fit for purpose and to better understand the current compressed natural gas marketplace. At the City's request Union agreed to working with the City, by assisting with their expertise.

The City & Union – Proposed Project

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- Union is prepared to offer this service, as requested by the City, on a dedicated, long term basis pending Council and Union Gas approvals and successful commercial negotiations.
- Union Gas has indicated they are supportive of either City ownership or Union Gas ownership of the CNG Station
- The following are benefits to the City:
 - Risk Mgmt – Union manages construction and maintenance variables
 - Efficiency – HSR staff focus on transit operations vs CNG station reliability
 - Financing – Union ownership provides option for reduced initial capital contribution from City based upon final contract terms.
- Potential for future natural gas sales to other CNG fleets. Subject to future negotiations. Need to consider site security/access and impact to HSR operations and potential revenue for the City.

Financial Breakdown (Examples)

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A

Contract Financial Analysis (\$3.6MM Capital Estimate)					
Contract Term	City of Hamilton Capital Contribution	Annual Base T1 Cost	Incremental Annual T1 Cost	Annual Maintenance Cost	Total Annual Cost
10 yr	\$3,020,000	\$150,000	\$0	\$175,000	\$325,000
	\$0		\$475,000	\$175,000	\$800,000
20 yr	\$2,600,000		\$0	\$175,000	\$325,000
	\$0		\$245,000	\$175,000	\$570,000

B

Contract Financial Analysis (\$4.5MM Capital Estimate) (+25%)					
Contract Term	City of Hamilton Capital Contribution	Annual Base T1 Cost	Incremental Annual T1 Cost	Annual Maintenance Cost (+25%)	Total Annual Cost
10 yr	\$3,920,000	\$150,000	\$0	\$220,000	\$370,000
	\$0		\$615,000	\$220,000	\$985,000
20 yr	\$3,500,000		\$0	\$220,000	\$370,000
	\$0		\$330,000	\$220,000	\$700,000

This example illustrates how various levels of capital contribution and different contract terms impact annual operating costs. Initial capital contributions by the City would result in reduced operating costs. Final costs and contract terms are subject to successful negotiation, bids pricing results.

Environmental Benefits (CNG vs. Diesel)

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- The transportation sector is Ontario's largest energy consumer, using 34 per cent of all energy consumed in 2010, and represents the single largest remaining share of Ontario's greenhouse gas (GHG) emissions.
- Reductions in greenhouse gas emissions associated with the buses that are converted from diesel to CNG of 20 to 25% OR 86 kilo-tons of CO₂ over 20-years. Standard conversion for 86,000 tonnes CO₂ equal:
 - 18,105 passenger cars
 - 2.2 million tree seedlings grown for 10 years
 - 11,829 homes' electricity use for 1 year
 - 200,000 barrels of oil consumed
 - 9.6 million gallons of gasoline consumed.
- Converting part of Transits fleet from diesel to CNG contributes to the City's goal of 80% reduction in GHG by 2050.

Item 7.6
Public Works Committee
April 22, 2014



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**2014 Transit Capital Fleet Replacement and
Compressed Natural Gas (CNG) Station
Replacement (PW12017b)(City Wide)**

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ALTERNATIVES FOR CONSIDERATION

- Purchase 60-foot diesel fuelled articulated buses in the alternative to 60-foot CNG fuelled articulated buses.
- Purchase 40-foot diesel fuelled buses in accordance with the 2014 approved transit fleet replacement capital budget in the alternative to purchasing 60-foot articulated buses.
- Purchase 40-foot CNG fuelled buses in accordance with the 2014 approved transit fleet replacement capital budget in the alternative to purchasing 60-foot articulated buses.
- Split order of 40-foot and 60-foot buses.

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RECOMMENDATION

- (a) Purchase (60') articulated vs. forty-foot (40');
- (b) Single source CNG fuelled buses;
- (c) Single source low excavation shop hoists;
- (d) Facility upgrades at the Mountain Transit Centre;
- (e) Agreements with Union Gas for the design, construction, maintenance, and ownership of a CNG station;
- (f) CNG station upgrades at 330 Wentworth Street;
- (g) Long-term land lease with Union Gas.

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