CITY OF HAMILTON

PUBLIC WORKS DEPARTMENT

Transportation Division

and

Corporate Assets and Strategic Planning Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	April 22, 2014
SUBJECT/REPORT NO:	2014 Transit Capital Fleet Replacement and Compressed Natural Gas (CNG) Station Replacement (PW12017b) - (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Don Hull, Director, Transportation (905) 546-2424, Extension 1860 Doug Murray, Manager, Transit Fleet Maintenance (905) 546-2424, Extension 2804 Mark Selkirk, Vehicle Maintenance Supervisor (905) 546-2424, Extension 5968 Geoff Lupton, Director, Energy, Fleet & Traffic (905) 546-2424, Extension 7372 Lyle Stedman, Manager, Central Fleet (905) 546-2424, Extension 4593 Tom Chessman, Manager, Office of Energy Initiatives (905) 546-2424, Extension 2494
SUBMITTED BY: **SIGNATURE:**	Gerry Davis, CMA General Manager Public Works Department

RECOMMENDATION

(a) That the General Manager of Public Works or delegate be authorized to amend the approved 2014 Transit Fleet replacement capital budget to purchase eighteen (18) sixty-foot (60') articulated buses at an upset cost of $15,500,000 in the alternative to the planned purchase of eighteen (18) forty-foot (40') buses at a budget cost of $8,765,000 with the understanding that the Transit Fleet replacement reserve remains sustainable for ten (10) years as identified in the Financial Section of Report PW12017b;

(b) That the General Manager of Public Works or delegate be authorized to single source the purchase of eighteen (18) CNG sixty foot articulated buses from New

Flyer Industries with the understanding that they are the only Canadian manufacturer;

(c) That the General Manager of Public Works or delegate be authorized to single source three (3) low excavation replacement shop hoists to accommodate the maintenance of the sixty-foot articulating bus fleet from Nova Quip Lifting Systems consistent with a previous approval in PW report PW10020 under Purchasing Policy 11 with the understanding that Capital budget has been approved for this purchase through project ID's #5301151500 and #5301351500 - Replace Bus Hoists in the total amount of $1,080,000;

(d) That related facility upgrades at the Mountain Transit Centre, for the purpose of due diligence and risk mitigation arising from AMEC's report (attached as Appendix A to Report PW12017b), be approved in the amount of $350,000 and funded from reserve #108027 - Transit Capital Grant Reserve;

(e) That the General Manager of Public Works be authorized to enter into all necessary agreements with Union Gas Limited (Union) for the design, construction and maintenance of a compressed natural gas station at the City's Transit facility at 2200 Upper James Street, in a form approved by the City Solicitor, with the understanding that there is no net levy impact and capital contribution not to exceed $3,600,000 to be funded from the Transit Provincial Gas Tax Reserve (Reserve #112204);

(f) That the General Manager of Public Works or delegate be authorized to complete identified CNG station upgrades at 330 Wentworth Street North as an emergency backup station to support the current natural gas operation for Transit, with the understanding that this station will also support any pilot of natural gas powered vehicles in the Central Fleet to be funded from reserve #108027 - Transit Capital Grant Reserve;

(g) That the Real Estate Section of the Planning and Economic Development Department be authorized and directed to enter into a long-term lease with Union Gas Limited for land suitable for a new natural gas compressor site at the Mountain Transit Centre, 2200 Upper James Street, together with a right-of-way for access to the natural gas compressor site, at a nominal ($2.00) rent per annum, subject to the satisfaction of the City Solicitor and the Real Estate Section of the Planning and Economic Development Department.

EXECUTIVE SUMMARY

Arising from Report (PW12017a) Council ratified a Staff recommendation that gave Staff direction to undertake a Business Case Analysis (BCA) respecting Transit Fuel (CNG vs. Diesel vs. Hybrid) and report back prior to a 2014 Transit Fleet replacement purchase decision.

This report recommends a managed incremental migration from diesel fuelled transit buses to CNG fuelled transit buses.

This report recommends a strategy for leveraging available Capital Budget dedicated to Transit for investment in mitigation of future Operating Budget pressures by:

- Amending the 2014 Transit Capital fleet replacement to purchase eighteen replacement sixty-foot (60) articulated buses in the alternative to the planned purchase of eighteen replacement forty-foot buses as a means to increase Transit capacity on bus routes that continue to experience overcrowding and bypassing of intending transit users in the alternate of adding forty (40) foot buses and the associated Operating Budget impacts. The implications on the Transit Fleet Reserve, Staffing and Operations are presented in the Financial Section of this report.
- Reducing the cost of fuel is among the most significant expenditure drivers in the Transit operating budget. The purchase of CNG fueled buses in the alternative to Diesel or Hybrid will have the following operating budget implications:
    - An estimated $1.9M annualized in cost avoidance due to the replacement of the remaining thirty-five (35) CNG with CNG;
    - Estimated annual savings of $1,490,000 in 2016 and an average of up to $3,750,000 annually to 2024 due to replacement of Diesel fleet with CNG.
- Introducing an opportunity to pilot the use of CNG fueled fleet, such as in Waste Management - a rapidly expanding business practice in the United States, to further reduce fuel costs and reduce Greenhouse Gas Emissions (86 Kilo-tons of CO_2 over the twenty years).
- Contributing toward Council approved report Climate Change Actions 2012 (BOH13024) which recommended reducing the City's Greenhouse Gas emissions 80% by 2050.

For the past eight years the City has partnered with other municipalities for Transit fleet purchases through the Metrolinx Governance agreement approved by Council in City of Hamilton/Metrolinx Multi-Year Governance Agreement (PW13092) - (City Wide). The Metrolinx tender was issued in Q1 2014 but does not include a provision for sixty foot articulated, CNG powered buses. The tender will include forty foot CNG powered buses, along with forty and sixty foot Diesel powered buses. For this reason, staff is recommending single source from New Flyer Industries, currently the only Canadian manufacturer of CNG sixty foot articulated buses.

It is necessary to complete related facility upgrades at the Mountain Transit Centre. The purpose of this expenditure is for due diligence and risk mitigation.

In accordance with Council's direction, Public Works staff from the Corporate Assets & Strategic Planning (Energy, Fleet, & Traffic Section) and Transportation Divisions contracted with Marathon Technical Services (Marathon or MTS), to undertake the BCA. An Executive Summary is provided as Appendix "B" to this report and the essential conclusions are as follows:

- It is recommended that the City of Hamilton change to CNG buses for the Transit fleet, as existing buses are retired. CNG provides a return of $41 Million net present value (NPV) over a twenty year period with a payback of seven years, as

compared to the current diesel bus plan. All CNG scenarios provided a positive NPV and payback;

- In the CNG approach, it is possible to contract for long term delivery of natural gas thereby locking in savings and reducing overall project risk;
- The twelve year life for all buses tends to be a conservative assumption since a longer life would favour both CNG and Hybrid - since both have higher bus costs than clean diesel;
- It is estimated that this project will create a savings of 86 Kilo-tons of CO_2 over the twenty years - demonstrating a strategic commitment to a "green" image for Hamilton based on a full transit fleet implementation;
- The CNG project is economically and technically feasible and it has positive environmental and social impacts.

The net benefits of expanding the natural gas fleet in the City of Hamilton are achieved through:

- fuel cost savings of up to 50% per kilometre and;
- reduced greenhouse gas emissions by 20% to 25%.

The compressed natural gas (CNG) station was originally installed in 1984 by the Hamilton Street Railway in conjunction with Union Gas Limited. This station is now well beyond its useful life cycle. Currently, the City of Hamilton spends approximately $300,000 annually to maintain the CNG station and reliability continues to be a problem. Based on recent condition assessment and concerns regarding reliability of the existing CNG station at 2200 Upper James any growth in the City's CNG Bus fleet requires that this station be replaced.

A Request for Information (RFI) was issued to determine the market capability to replace the CNG station at Transit and it is realized that the market is diverse and complicated. Station sizing, construction planning and capital costs are varied and difficult to navigate. 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. Union is interested in assisting Hamilton's commitment to expand the CNG bus fleet by applying their expertise in natural gas compression and distribution to the project.

Union's expertise from owning several compressor stations of its own make them a good potential partner for the City with the design and construction of CNG station. Further to the City's discussions a Letter of Intent and MOU was executed between Union and the City for a potential opportunity to design/build/maintain a new compressor station at the Mountain Transit Centre. Under this arrangement the station would be fully owned by Union and would see Union as the General Contractor manage the compressor selection and construction through their competitive bid process. With Union's involvement the station reliability will be greatly enhanced by being continuously monitored for failure or maintenance as part of their distribution system. Union would provide options for recovering maintenance and capital costs from the City through its

rates. Essentially, the CNG Station becomes an extension of Union's natural gas distribution system.

Union is the expert in natural gas distribution and compression in Southwestern Ontario and has been heavily involved in the successful methane gas capture program at the Hamilton Water Biogas Plant. Nurturing this new CNG arrangement would further strengthen the current solid relationship between Union Gas Limited and the City of Hamilton. Union has also expressed an interest in providing future stations to compliment the growing light duty and waste collection fleet as those vehicle counts grow within Central Fleet and this program reveals its successes.

The increased articulated bus fleet will require additional three-post hoists to facilitate repairs. In Report PW10020 approved by Council on March 10, 2010, the shallow excavation hoist manufactured by Stertil Koni, as supplied by Novaquip Inc., was recommended and approved. The current hoists in use at Transit are more than thirty years old and the manufacturer (Ford Smith) is no longer in business.

A Stertil Koni hoist was installed at Transit in 2010 and has provided excellent service with no downtime. It is the preferred product from an operator point of view. The ECOLIFT system requires only 10.5 gallons of oil while conventional systems can require up to 100 gallons. The ECOLIFT is ecologically friendly and is intended to reduce carbon footprints by; the reduction in required amounts of oil, eliminating contaminants from entering the soil, and removing the need to excavate to a depth of eight feet or greater, and the associated equipment to do so, all provide an increased level of environmental stewardship. The current hoists at the MTC could be modified to have additional posts added thereby providing additional service areas for articulated buses. While it is feasible to do so, this would not provide the environmental and operational benefits being sought by the HSR. Further, while alternate similar hoist systems may be available on the market, staff is recommending continuity in the hoist replacement program so as to ensure the highest level of safety for the mechanics.

This report recommends CNG station upgrades in an amount not to exceed $300,000 and funded from reserve #108027 - Transit Capital Grant Reserve at 330 Wentworth Street North as an emergency backup station to support the current natural gas operation for Transit. In recent years, the actual cost of maintaining the City's obsolete CNG stations has been approximately $300,000 per year as noted and approved in Report PW12017 - Conventional Transit (HSR) Fleet Purchasing Policy Review Request for Policy 11 Approval. After site replacement at HSR, the annual maintenance for both CNG stations is estimated at $235,000 per year with future capital responsibility for the HSR site now resting with Union.

Alternatives for Consideration - Page 11

FINANCIAL - STAFFING - LEGAL IMPLICATIONS

Financial:

(a) As shown in the following Table, the switch from forty foot Diesel to sixty foot CNG buses still allows for the reserve to remain sustainable to 2023;

Transit Conventional & Non Revenue Fleet Reserve - 110030

Year		Actual 2013	Projection 2014	Projection 2015	Projection 2016	....	Projection 2022	Projection 2023
Opening Reserve Balance - Jan 1		**-15,053,913**	**-18,770,033**	**-15,253,113**	**-15,216,358**		**-10,803,410**	**-5,720,541**
Add:	Transfer From Operating - Cont to Reserve	-3,131,130	-3,131,130	-3,581,130	-4,093,753		-6,022,144	-6,140,270
	Annual Contribution Increase/Decrease	0	-450,000	-450,000	-450,000			
	Increase Contribution to Reserve - Inflation			-62,623	-71,623		-118,126	-120,443
	From Non Transit Operating	-452,995	-700,000	-700,000	-700,000		-700,000	-700,000
	From Federal Gas Tax	0	-6,000,000	-3,000,000	-3,000,000		-3,000,000	-3,000,000
	Sale of Vehicles/Scrap Value	-43,514	-18,700	-18,700	-59,500		-59,500	-59,500
	Reverse Excess Capital Funding	-13,671						
	Interest Revenue	-405,912	-461,219	-413,019	-410,446		-223,316	-69,487
Total Revenues to Reserve		**-4,047,222**	**-10,761,050**	**-8,225,472**	**-8,785,322**		**-10,123,086**	**-10,089,700**
Less:	Net Vehicle Replacement Capital Costs	0	13,555,000	7,632,258	8,284,000		14,849,998	15,938,996
	Hybrid Battery Replacement	0	367,000	209,000	215,000			
	Less Non Revenue Vehicles	60,132	85,000	150,000	127,500		85,000	138,270
	Less FCM/GMF # 9458 Loan Repayment	270,970	270,969	270,969	270,969		270,957	270,957
Total Transfers from Reserve		**331,102**	**14,277,969**	**8,262,227**	**8,897,469**		**15,205,955**	**16,348,223**
Estimated Ending Reserve Balance - Dec 31		**-18,770,033**	**-15,253,113**	**-15,216,358**	**-15,104,210**		**-5,720,541**	**537,983**

(b) The proposed shop hoists are to be funded by previously approved capital projects #5301151500 and #5301351500 in the total amount of $1,080,000;

(c) The Mountain Transit Centre facility upgrades, in the amount of $350,000, are to be funded from the Transit Capital Grant Reserve (#101027). The reserve remains sustainable with the addition of this project's funding;

(d) Sufficient funding exists in the Transit Provincial Gas Tax Reserve (#112204) to fund the design and construction of a compressed natural gas station at the City's Transit facility at 2200 Upper James Street with an upset limit of $3M;

(e) The completion of CNG station upgrades at 330 Wentworth Street North in the amount of $300,000 are to be funded from reserve #108027 - Transit Capital Grant Reserve which has sufficient available funds with this additional project.

Staffing:

No additional staff are required arising from this report.

Legal:

A Memorandum of Understanding (MOU) was executed between the City of Hamilton and Union Gas Limited on February 3, 2014. This MOU constitutes a non-binding framework for the parties' negotiations with respect to a potential transaction pursuant to which Union and City would seek to enter into definitive agreements for the purchase by the City of CNG from a CNG facility to be owned and maintained by Union at 2200 Upper James Street. The MOU stipulates that Union will not be in a position to enter

into any Agreements unless and until the Potential Transaction has been approved by the Board of Directors of Union and certain senior executive officers of Union and if applicable, its parent Spectra Energy Corp, in accordance with internal approval policies of Union and its parent Spectra Energy Corp. The MOU also stipulates that the City will not be in a position to enter into any Agreements unless and until the Potential Transaction has been approved by City Council to enter into an agreement with Union, subject to the satisfaction of the City Solicitor and other senior staff as authorized by City Council.

The non-binding provisions of the MOU are as follows:

The City and Union will discuss the potential for the design, construction and operation of a compressed natural gas station at the Transit facility at 2200 Upper James Street with anticipated commissioning date in late 2014.

It is proposed that Union would design, construct and own the compressor and would assume responsibility for the maintenance of the compression facilities and may supply maintenance to relate City owned equipment on City property as part of the integrated compressed natural gas fuelling system. The agreement includes the potential for Union to provide ongoing site monitoring as part of their regular distribution network.

The costs for Union to design, build and maintain the compression facilities are proposed to be recovered by Union from the City through an OEB approved distribution charge and/or a monthly fee/rate which could be adjusted by a capital contribution from the City.

Union may use third party vendors for the provision of any and all of the services such as compressor design and procurement, installation and maintenance associated with this arrangement.

The City will provide all certified on-site operating engineers and operating practices necessary to meet Union Gas requirements. The City would also provide all necessary electricity for the facilities.

The City will provide a suitable land site for the compressor facility that complies with all regulations and will permit access to the site as required by Union or its third party delegate.

Subject to the feasibility of this arrangement at the 2200 Upper James Street facility, Union and the City may consider a similar project to replace an existing facility at 330 Wentworth Street North or to install a time fill station at 1579 Burlington Street East with the projected commissioning to be determined by the growth of compressed natural gas powered fleet vehicles.

HISTORICAL BACKGROUND

HAMILTON STREET RAILWAY

The City commissioned construction of the natural gas fuelling stations at the Mountain Transit Centre in 1984 and at Wentworth Street North in 1990. Transit continued to purchase compressed natural gas (CNG) buses until 2003 reaching a peak fleet of 173.

However, cost and quality concerns drove a decision to transition out of CNG via the annual transit bus replacement cycle whereby Diesel and Hybrid replaced CNG. As of 2014 there remains 35 CNG fuelled buses in the Transit fleet.

Reliability of the station has become an increasing concern over the past several years as the station is well beyond the expected life of the asset. Escalating annual maintenance costs prompted a condition assessment. Due to age and use, the present CNG compressor station is considered to be too fragile to support CNG fleet expansion. The current compressor has been in service since the opening of the Mountain Transit Centre in 1984. At the time it was a blend of existing compressors moved from the original Wentworth Street North operations centre and new compressors of higher capacity with a unique design that did not find a broader market. Replacement parts are now obsolete or extremely difficult to find and many of the larger internal items have had to be specially made at extended downtime and higher costs.

In support of a growing compressed natural gas transit fleet, a reliable fuel and vehicle supply has to be in place to ensure service levels and overall program success is realized. Staff has worked with Union Gas Limited to develop a Memorandum of Understanding to have Union Gas Limited design and build the new compressor station at the transit facility at 2200 Upper James Street. Union Gas will absorb ownership of the station and integrate it into their overall distribution network where it will be continuously monitored for reliability, scheduled maintenance and repairs.

Fuel costs represent the most volatile expenses within HSR's operating budget. Negotiating supply contracts has helped improve the predictability of this major expense, however the City has limited ability to negotiate a long term favourable price. Natural gas has demonstrated better pricing stability and is projected to continue that trend well in the future. The increasing gap between natural gas and diesel price now makes operating CNG buses economically attractive.

Historically, previous generation CNG buses were not as reliable as diesel buses. However, with the introduction of ultra-low sulphur fuels and the requirement for enhanced emission control systems to meet federal emission standards diesel buses are becoming less reliable than before. At the same time, the fourth generation CNG engines have shown substantial improvements in reliability. The current generation of natural gas engines meets all current emission regulations and is substantially cleaner with far simpler exhaust controls.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

This report recommends a managed incremental migration from diesel fuel transit buses to CNG fuel transit buses.

RELEVANT CONSULTATION

Public Works Department: Corporate Assets & Strategic Planning Division - Office of Energy Initiatives and Central Fleet Sections; Transportation Division

Corporate Services Department: Financial Services Division - Procurement Section

City Manager's Office: Legal Services

Planning and Economic Development Department: Economic Development Division - Real Estate Section

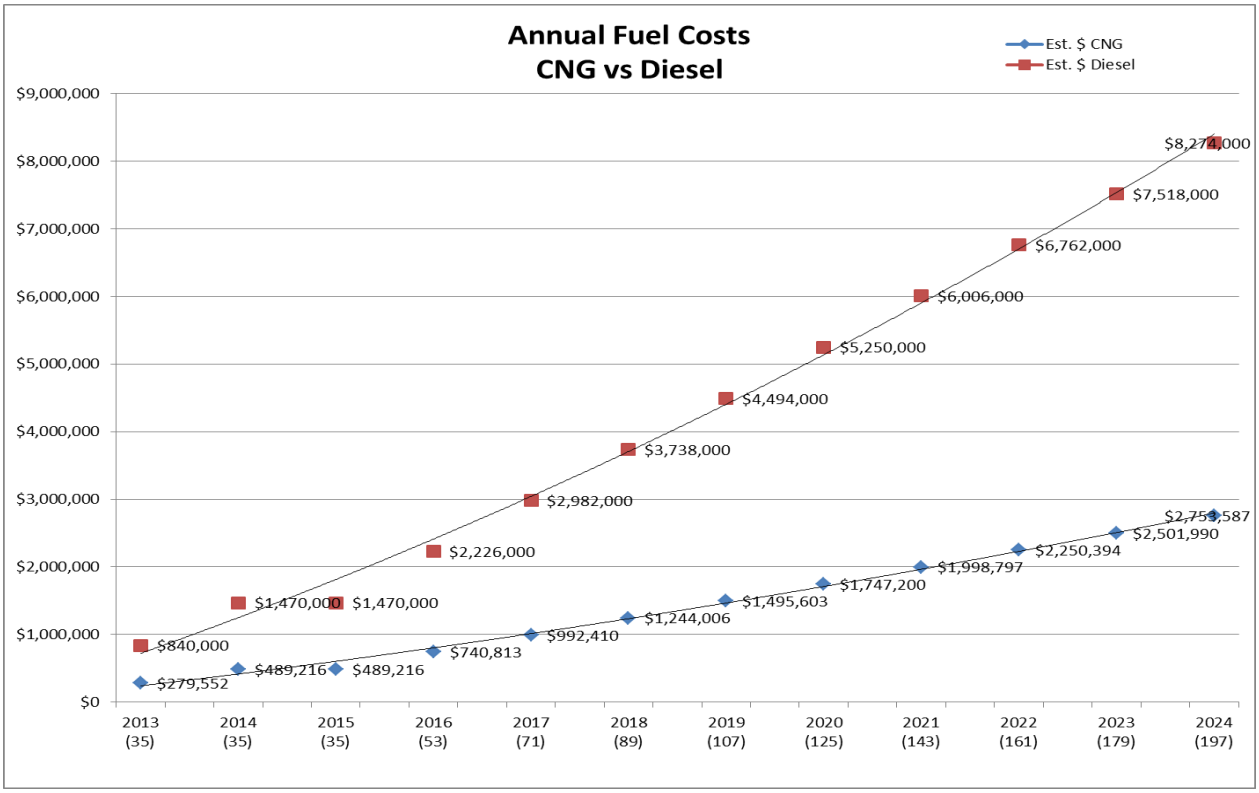
ANALYSIS AND RATIONALE FOR RECOMMENDATION

The purchase of sixty-foot articulated buses in the alternative to forty-foot buses presents an opportunity to increase system capacity on routes that continue to experience overcrowding and bypass in the alternative to the operating cost of adding Bus Operators.

The managed migration from diesel fuelled buses to CNG fuelled buses presents the opportunity for cost avoidance and savings as follows:

- An estimated $1.9M annualized in cost avoidance due to the replacement of the remaining thirty-five (35) CNG with CNG;
- Estimated annual savings of $1,490,000 in 2016 and an average of up to $3,750,000 annually to 2024 due to replacement of Diesel fleet with CNG.

Maintaining a CNG-fuelling station at 330 Wentworth Street North will serve the dual purpose of an emergency backup for fuelling transit buses plus affords an opportunity to pilot CNG fuelling in other City fleet - a rapidly expanding experience in the USA.



HSR's fleet of 221 (Fall 2013) buses currently operates mainly on diesel fuel with 35 buses being powered by natural gas. In 2013, almost 10 million litres of diesel fuel was consumed. With the introduction of federal regulations mandating emission after treatment components on diesel engines, diesel buses are experiencing lower reliability rates and higher maintenance costs than in pre-2007 model years. These after treatments include; Diesel Particulate Filters (DPF) for reduction of particulate matter, Diesel Oxidation Catalyst (DOC) mainly for the reduction of Carbon Monoxide, Selective Catalytic Reduction (SCR), in conjunction with Diesel Exhaust Fluid (DEF) which is injected into the exhaust system to reduce nitrogen oxide (NO_x) output. The use of DEF adds approximately $.03/litre to the cost of fuel for the buses that require it (41 HSR buses at this time require DEF). There are no after treatments required for CNG engines other than the Catalytic Converter.

A Request for Information (RFI) was issued to determine the market capability to replace the CNG station at Transit and it is realized that the market is diverse and complicated. Station sizing, construction planning and capital costs are varied and difficult to navigate. 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. Union is interested in assisting Hamilton's commitment to expand the CNG bus fleet by applying their expertise in natural gas compression and distribution to the project.

Union's expertise from owning several compressor stations of its own make them a good partner for the City with the design and construction of CNG station. Further to the City's discussions a Letter of Intent and MOU was executed between Union and the City to design/build/maintain a new compressor station at the Mountain Transit Centre. Under this arrangement the station would be fully owned by Union and would see Union as the General Contractor manage the compressor selection and construction through their competitive bid process. With Union's involvement the station reliability will be greatly enhanced by being continuously monitored for failure or maintenance as part of their distribution system. Union would provide options for recovering maintenance and capital costs through its rates adjusted based on percentage of capital contribution from the City of Hamilton. Essentially, the CNG Station becomes an extension of Union's natural gas distribution system.

Union is the expert in natural gas distribution and compression in Southwestern Ontario and has been heavily involved in the successful methane gas capture program at the Hamilton Water Biogas Plant. Nurturing this new CNG arrangement would further strengthen the current solid relationship between Union Gas Limited and the City of Hamilton. Union has also expressed an interest in providing future stations to compliment the growing light duty and waste collection fleet as those vehicle counts grow within Central Fleet and the Transit CNG program reveals its successes.

Union Gas Limited and the City of Hamilton have a solid and long working relationship and as 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. 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.

The Union Gas supply of natural gas comes from many western marketing sources and a portion is from the latest fracking technology. When it comes to the extraction of natural gas from shale, industry, regulators, governments and non-governmental organizations are working collaboratively to ensure that the extraction process is understood and that rules and regulations reflect the balance between this enormous economic opportunity and the necessity of protecting our natural environment. Union Gas supports the development and adherence to smart regulations that provide environmental protection at all stages of the development process. It is important not to lose sight of the enormous economic benefits of shale gas.

ALTERNATIVES FOR CONSIDERATION

Staff could be directed to purchase sixty foot diesel fuelled articulated buses in the alternative to sixty foot CNG fuelled articulated buses.

Staff could be directed to purchase forty foot diesel fuelled buses in accordance with the 2014 approved transit fleet replacement capital budget in the alternative to purchasing sixty foot articulated buses.

ALIGNMENT TO THE 2012 - 2015 STRATEGIC PLAN

Strategic Priority #2

Valued & Sustainable Services

WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.

Strategic Objective

2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.

APPENDICES AND SCHEDULES ATTACHED

Appendix “A” AMEC report
Appendix “B” Executive Summary - Marathon Technical Services