NATURAL GAS
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Natural Gas Vehicles and Refueling Project

Recommendation to Council

Prepared by LGenest

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Executive Summary

In 2016 the County of Vermilion River Gas Utility began a pilot project for conversion of County vehicles to bi-fuel Compressed Natural Gas (CNG)/Gasoline. The Pilot included conversion of two light trucks and construction of a small CNG refueling station. The purpose of the pilot was to evaluate projected financial and operational implications of CNG vehicles. If unsuccessful, the Pilot was to be concluded. If successful, Gas Utility was to bring a recommendation to Council on expansion of the program. The Pilot Project has proven successful and projections generally confirmed. Based on initial success of the Pilot, the County CNG fleet has been expanded by 6 vehicles from 2017-2019, with 8 vehicles now operating on natural gas.

A study (funded in part by the FCM Green Municipal Fund) was carried out by Jenmar Consulting and Natural Gas Utility staff to investigate further expansion of the County Fleet and Public/Private CNG fleets and refueling. Based on the study a recommendation was made to Council and capital funding applications were submitted under the Environment and Climate Change Canada (ECCC) – Low Carbon Economy Fund and the Natural Resources Canada (NrCan) – Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative. The application under the NrCan Initiative was successful. The Initiative provides 50% Capital Funding for publicly accessible CNG refueling infrastructure up to $1,000,000.

As further outlined herein, the Gas Utility recommends that the County proceed with construction of a dual purpose County/Public CNG Refueling Station, expansion of the County CNG Fleet, and preparation of pilot project proposals for private CNG vehicle fleets.

Findings

The Study and subsequent research produced several key findings including:

- **FortisBC** is a leader in Canada in CNG vehicles and refueling. Fortis' over 20 years of experience in the CNG vehicle market should be utilized as a resource in developing our CNG vehicle program.
- Estimated **fuel cost** of $0.60/GLE (Gasoline Litre Equivalent) at current commodity pricing including cost of refueling infrastructure and ongoing operations.
- Potential **net savings** estimated between $600,000 - $1,300,000 (dependent on grant funding) over a 15 year period on a 35 vehicle fleet. With potential for additional revenue from public refueling.
- Conversion costs and practical vehicle concerns limit interest in conversion of family vehicles and existing public convenience-style fueling in Canada has not been commercially viable. Current commercial opportunity exists primarily in **commercial fleets**.
- **Commercial CNG haulers** expressed only minor interest in refilling at our location and demanded fill times that nearly double the cost of refueling infrastructure. In order to justify sizing infrastructure to accommodate bulk CNG haulers, 6 fills per week would be required, which is unlikely.
- **Vehicle Conversions** are the most challenging part of a CNG vehicle program. Vehicle manufacturers have generally exited the CNG market.
    - FortisBC conducts extensive research and development on conversion technology and is willing to share information on conversions.
    - There are four main CNG conversion technology providers in Canada. All are willing to provide training and assistance to develop local conversion/servicing capacity.

- Numerous options for **refueling infrastructure** exist depending on needs of the customer (fleet size, fill timing, metering, redundancy, etc.)
- Preliminary interest exists for **private CNG fleets**. However, customers are reluctant to put up capital investment required for refueling. FortisBC Model is to own and operate refueling infrastructure and recover through contracts for fuel deliver. CNRL requested a proposal on CNG refueling and vehicles.
- Several **Grant funding** programs exist that could provide capital funding for CNG Refueling Infrastructure and fleet conversion. We have applied for funding under the Environment and Climate Change Canada – Low Carbon Economy Fund (LCEF) for 40% Funding. Additionally the Natural Resources Canada – Alternative Refueling Infrastructure Grant is planning a Request for Proposals in spring, 2019. The NrCan program specifically for alternative refueling infrastructure, requires public fueling availability, which adds costs of creating a publicly available cardlock system.

Recommendations

County Fleet

- Conversion of all new County light duty vehicles to Bi-Fuel CNG beginning in 2020-2021, with conversion costs to be funded by each department through Capital Equipment Budgets.

  Except in cases where CNG equipment cannot be accommodated due to a specific vehicle use.

County/Public Refueling Infrastructure

- Construction of a fast fill CNG refueling station as follows::
  - Approximate fill time 3-10 minutes / vehicle
  - Publicly-available point-of-sale CNG Dispenser
  - Estimated cost $1,300,000
  - Limited capacity for filling bulk CNG haulers
  - Funded from the Gas Utility Project Reserve and the NrCan grant and recovered through fuel charges.

Vehicle Conversions

County Fleet

- Develop in-house expertise on installation of physical equipment (tanks, covers, tubing, regulator and injectors) which would further increase projected cost savings
- Utilize conversion equipment providers for programming of equipment
- Apply for Provincial and Federal grant funding for fleet conversions

Private Fleets

- Private fleets will be responsible for their own vehicle conversions and servicing
- Contact local automotive service shops and conversion equipment providers to develop local private conversion/servicing shop.

Commercial Fleet Refueling

- Submit proposal to CNRL as outlined in the Study:
  - County owns and operates refueling station at CNRL Blackfoot
  - Capital cost of approximately $900,000 funded through Capital Financing
  - Fast and time fill capacity for 15-30 trucks
  - Fixed contract with ROI of approximately 7 years
- Report results of the project back to customers and Council and pursue additional customers.
- Prepare information package and meet with key trucking industry members and fellow Natural Gas Vehicle industry members.

Home Refueling

- Prepare a pilot project proposal for County-owned/operated time fill CNG refueling installed at a customer property, for Council review.

Operations & Administration

- We estimate 0.5 FTE administration and operations staff will be required to maintain County Fleet. Overhead has been factored into County Fleet Fuel Price. We feel we can initially accommodate administration and operation at existing staffing levels.
- Any expansion into private refueling requires additional operations and admin staff. These costs have been factored into proposals.

Environmental

- Natural Gas is the cleanest burning fossil fuel. We believe it is the most practical and environmentally beneficial motor vehicle option in Canada. The proposed project will reduce vehicle GHG emissions by 23% vs. gasoline. And, at peak, we will be reducing fleet GHG emissions by nearly 400 metric tons/year.

CRL FLEET GHG EMISSION REDUCTIONS

JENMAR CONCEPTS

Project Identification:	CVR - CNG FOR CLIENT FLEETS	Job No.:	99-106 Phase 2
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Ref Drawing No.:	NA	Date:	2019-03-26
Prepared by:	J. Neels	Page:	
Checked by:		Approved:	

Pick Up Trucks - GHG Emission Reduction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10		
Number Trucks converted	16.0	19.0	22.0	25.0	28.0	30.0	30.0	30.0	30.0	30.0		
Annual distance per vehicle	135000.0	135000.0	135000.0	135000.0	135000.0	135000.0	135000.0	135000.0	135000.0	135000.0	km	
Fuel consumption (CNG)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	km/GLE	
Gasoline Fuel used per annum	378947.4	450000.0	521052.6	592105.3	663157.9	710526.3	710526.3	710526.3	710526.3	710526.3	GLE	
	12435.3	14767.0	17098.6	19430.2	21761.9	23316.3	23316.3	23316.3	23316.3	23316.3	Mcf	
Natural gas green house gas emissions	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	Metric Tons CO_2/MCF	https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
Annual emissions (CNG)	685.3	813.8	942.3	1070.8	1199.3	1285.0	1285.0	1285.0	1285.0	1285.0	Metric Tons	
Gasoline green house gas emissions	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	8.89E-03	Metric Tons CO_2/gallon of gasoline	https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
Annual emissions (gasoline)	889.8	1056.6	1223.4	1390.2	1557.1	1668.3	1668.3	1668.3	1668.3	1668.3		
Annual reduction in greenhouse gases	204.4	242.8	281.1	319.4	357.8	383.3	383.3	383.3	383.3	383.3	Metric Tons	
Accumlative reduction	204.4	447.2	728.3	1047.7	1405.5	1788.8	2172.2	2555.5	2938.8	3322.1	Metric Tons	
Reduction in %	23%	23%	23%	23%	23%	23%	23%	23%	23%	23%		
Number of passenger vehicles off the road	43	52	60	68	76	81	81	81	81	81		EPA - 4.71 Metric Tons CO_2 E/ Vehicle/year

Projected Savings Summary

Fleet Details				
# of Vehicles			35	
Average Yearly Mileage	km		35,000	
Period	Years		15	
Fuel Consumption	L/100km		16	
Fuel Pricing				
Gasoline	/GLE	$	1.10	*
CNG Cost	/GLE	$	0.16	*
CNG Refueling & Conversion				
Initial Conversion		$	15,500	
Subsequent Conversion (Year 7-8)		$	5,000	
Fueling Station CAPEX		$	1,150,000	
Public Refueling CAPEX		$	150,000	
Fueling Station OPEX		$	496,888	
Total Costs				
Gasoline		$	3,704,340	
CNG		$	538,813	
Refueling		$	1,796,888	
Conversions		$	727,500	
Total		$	3,063,201	
15 Year Net Savings no Grants		**$**	**641,139**	**
15 Year Net Savings NrCan Funding		**$**	**1,291,139**	**

*Projected to increase 3%/year on averge

**Proposed savings do not include projections for public refueling revenue

CVR Yard Concept Layout