REPORT
Regular Council Meeting
1991 April 15

THE CORPORATION OF THE DISTRICT OF BURNABY

ENVIRONMENT AND WASTE MANAGEMENT COMMITTEE

HIS WORSHIP, THE MAYOR
AND ALDERMEN

RE: ALTERNATIVE FUELS - BURNABY FLEET VEHICLES

RECOMMENDATIONS:

1. THAT Council approve the proposed alternative fuels pilot program for a limited number of Municipal vehicles at an estimated cost of approximately $12,000.

2. THAT Council authorize staff to evaluate the proposed program and report back to Council 12 months after the implementation of the pilot program outlining an overall alternative fuels strategy for all Municipal vehicles.

R E P O R T

The Environment and Waste Management Committee, at its meeting held 1991 April 09 received and adopted the attached staff report which provides an update on the state of alternative fuels potential for Burnaby's vehicle fleets, and outlines an approach to future fleet fuel usage.

The Committee therefore submits its recommendations for alternative fuels to Council for endorsement.

Respectfully submitted,

Alderman L. Rankin
Chair

Alderman D.P. Drummond
Member

Alderman D. Evans
Member

Alderman D. Lawson
Member

Alderman C. Redman
Member

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- DIRECTOR ENGINEERING
- DIRECTOR PLANNING & BUILDING INSPECTION

The Corporation of the District of Burnaby

INTER-OFFICE COMMUNICATION

TO: CHAIRMAN & MEMBERS, ENVIRONMENT & WASTE MANAGEMENT COMMITTEE

DATE: 1991 03 25

FROM: DIRECTOR ENGINEERING

FILE: ENERGY

SUBJECT: ALTERNATIVE FUELS - BURNABY FLEET VEHICLES

PURPOSE: To update the Committee on the state of alternative fuels potential for Burnaby's vehicle fleets, and to outline an approach to future fleet fuel usage.

RECOMMENDATIONS:

1. THAT the Environment & Waste Management Committee recommend to Council:

   a) approval of the proposed alternative fuels pilot program for a limited number of Municipal vehicles at an estimated cost of approximately $12,000,

   b) that staff undertake an evaluation of the proposed program and report back to Council 12 months after the implementation of the pilot program outlining an overall alternative fuels strategy for all Municipal vehicles.

REPORT

1.0 BACKGROUND

Council, at the regular meeting held on 1990 November 13 received a report from the Planning Department outlining several follow-up actions in support of Environment and Transportation Awareness Week.

One of the recommended actions subsequently adopted by Council is to assess the feasibility of implementing alternative fuels for Municipal vehicles. This report is to present the Committee the results of the evaluation and to outline a recommended strategy for implementation.

2.0 PRESENT CONDITION

According to a survey conducted by GVRD, over 80% of airborne emissions contributing to air quality problems in the Lower Mainland come from motor vehicles. Emissions from motor vehicles include hydrocarbons and nitrogen oxides which when combined with sunlight produce carbon monoxide and lead.

The growing concern of air pollution and automobile emission problems combined with the rising cost of gasoline have led many fleet operations in the Lower Mainland to examine alternative fuels such as natural gas and propane.

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3.0 ALTERNATIVE FUELS SOLUTION

3.1 General

Although there is a variety of alternative fuels such as diesel, methanol and electric available, the two most practical and cost-effective alternatives to gasoline are natural gas and propane. Both have an established history of use and have developed a filling station network for passenger cars and light duty trucks. Vehicles can be converted to use either of these fuels at a reasonable cost.

For Municipal applications, the propane and natural gas options were evaluated and the findings are presented in this report.

3.2 Burnaby's Experience

Burnaby was a forerunner in looking to alternative fuels and undertook a limited number of conversions (10 vehicles) to natural gas systems in the mid 1980's. Experience acquired at that time indicated that the technology and distribution systems were not sufficiently reliable to justify fleet conversions and a long term decision was premature. At the present time, none of these 10 vehicles is operating on the alternate fuel system. Some other municipalities in the Lower Mainland are now looking to alternate fuels and Burnaby is ready to reassess the viability of a fleet conversion, in the light of technological advances and fuel availability.

3.3 Propane

Propane is currently the most widely used and readily available alternative to gasoline.

a) Conversion Cost:

Preliminary discussions with local fuel distributors indicate that conversion costs can vary but a standard conversion is priced at about $1,700 per unit plus GST, including installation of a fuel tank.

b) Fuel:

Propane conversions can run on propane only (single fuel) or on a propane and gasoline (dual fuel) system that offers a longer travel range between fillings. Propane is normally stored in cylindrical vehicle tanks at 128 psi.

c) Exhaust Emissions:

Under the same operating condition and duration, emissions of carbon dioxide are found to be approximately 12% less than gasoline. Hydrocarbon and carbon monoxide levels are reported to be about the same as gasoline and nitrogen oxides are reported to be higher than gasoline.

d) Operating Impact:

Compared to running on gasoline, propane vehicles lose about 5% of power, and fuel usage averages 10 to 20% more. The operating range of propane-powered vehicles is slightly lower than that of gasoline-powered ones due to the lower fuel economy for propane. Fuelling times are comparable to gasoline systems.

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e) Operating Cost:

Based on current fuel prices and the average operating condition of "medium type" vehicle (vans and mini pickups), a cost saving of $100 per month per vehicle in fuel could be realized. The initial capital cost of conversion can be recovered in a 2 year period. It is anticipated that further cost saving in vehicle maintenance would result but detailed information is not available at this time.

3.4 Natural Gas

Natural gas is currently not as popular as propane. It is newer to the marketplace and the filling station network is less established.

a) Converson Cost:

Preliminary discussions with B.C. Gas indicate conversion costs to be $2,000 less a $600 rebate (ie. $1,400) plus GST. This does not include installation of 2 fuel tanks per unit which B.C. Gas suggests would be better rented to reduce capital costs. Tanks cost is in the order of $1,000 per set, renting at $18/month.

b) Fuel:

Natural gas conversions are currently recommended to run on a dual fuel system, therefore using considerable space in vehicles for both gasoline and natural gas tanks. Natural gas is stored in cylindrical vehicle tanks at 3,000 psi.

The dual fuel system works well with late model vehicles with electronic ignition. For vehicles with carburetor, the unit must be run on gasoline frequently to properly maintain the carburetor. For this reason, it is not advisable to convert early model vehicles with standard carburetor to natural gas operation.

c) Exhaust Emissions:

Emissions of carbon dioxide and hydrocarbons are reported to be considerably less than gasoline.

d) Operating Impact:

Compared to running on gasoline, natural gas vehicles lose 10% of power, but fuel usage is reported to be 10 to 15% lower. Despite lower fuel usage, fuel tank size does not permit similar vehicle range to gasoline. The operating range of natural gas vehicles is approximately half of gasoline vehicles thus requiring more frequent re-fuelling. However, with a dual fuel system, one can switch over to gasoline until reaching the next filling station.

e) Operating Cost:

Under current pricing structures an average of $110/month could be saved on fuel costs per "medium type" unit (vans, mini pickup, etc.). The payback period for the capital conversion cost is similar to that for propane.

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3.5 Filling Station

In assessing the suitability of any fuel conversion in Burnaby, the delivery of the alternate fuel to the Service Centre becomes a critical factor.

Other municipalities like Surrey and West Vancouver have opted for a larger scale conversion of their vehicles to natural gas, which required construction of refuelling stations at their work yards. These stations represent large capital expenditures in the order of $250,000, potentially offset by long term contracts with B.C. Gas.

Due to various site and transmission constraints at the present Works Yard site, a central Municipal refuelling station at the Service Centre is not feasible.

To provide optimum service fuelling our fleet, in the absence of a refuelling station at the Service Centre, there are 2 filling facilities for natural gas and 7 for propane within Burnaby that can be utilized for Municipal operations.

3.6 Emissions Policy

To date there are no emission test results specific to the municipal vehicle sector available in the Lower Mainland.

We understand that the City of Toronto has initiated a "Green Fleet" program, part of which calls for emission monitoring, using an Exhaust Analyzer to evaluate Municipal vehicle exhaust emissions. Results of the study would benefit Burnaby in evaluating the effectiveness of alternate fuel and in developing an overall strategy for the implementation of alternate fuel system in Municipal operations.

A summary comparison of the alternative fuels system is given in Table 1 attached.

4.0 PROPOSED PILOT PROGRAM

4.1 General

Based on the foregoing alternative fuels analysis, a conclusion can be reached that both propane and natural gas offer a practical and cost effective alternative to gasoline. In addition, preliminary reports indicated that both fuels have a lower emissions of carbon dioxide than gasoline which would contribute to improving air quality problems.

It is recommended that a pilot program be initiated for a limited number of Municipal vehicles for a 12 month period and a performance evaluation be conducted after the trial period to assist in formulating an alternate fuel strategy for all Municipal vehicles.

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4.2 Selection of Vehicle Types

Burnaby currently runs two vehicle fleets:

a) Small Passenger Vehicles:

This fleet is limited primarily to small sub-compact type vehicles adminstered by the Purchasing Department with varying dealer warranties and servicing arrangements. This fleet numbers approximately 80 vehicles.

These vehicles are operating with good fuel economy. In view of the potential power loss, space limitations and fuelling procedures, it is recommended that these vehicles not be included in the initial conversion program until more operating knowledge is gained through the testing of other more suitable vehicles.

b) Medium and Heavy Trucks and Equipment:

Presently, there are 75 medium type (mini van, van, mini pickup) and 50 heavy type (refuse/recycling collection and dump truck) vehicles administered and serviced through the Municipal Service Centre.

Burnaby's past experience with heavy trucks conversion program concludes that the engine power could be reduced by as much as 38% thus making the alternate fuel program technically not feasible. The truck industry also concurred that the best approach for heavy trucks and equipment is to purchase them with a factory designed fuel system. It is understood that factory designed alternate fuel system will be available in 1994 for heavy trucks and construction equipment. Currently, the only Municipal heavy equipment with factory designed propane system is the new pavement marking truck manufactured by Ford.

For medium type vehicles, it is recognized that the alternate fuel usage would result in 5-10% power loss. Initial discussions with B.C. Gas and the propane industry indicate that the medium type vehicles are the most suitable candidates for alternate fuel conversion. It is recommended that 3 classes of medium type vehicles be selected for conversion to alternative fuels. This would include mini van, mini pickup and full-size van. It is further recommended that both propane and natural gas be selected as the alternative fuels under the pilot project. This would require that a total of six vehicles be converted (2 of each of the 3 classes). Propane and natural gas will be installed separately in these two groups of vehicles so that proper evaluation can be carried out with respect to performance, fuel economy, maintenance and exhaust emissions.

4.3 Estimated Capital Cost

The estimated capital cost of converting 6 Municipal vehicles to alternate fuel operation is approximately $12,000. The capital cost can be recovered in a 2 year period through an estimated cost saving of $100-$110 per month per vehicle in fuel. Funds for the conversion are currently available in the 1990-1994 Capital Budget under Energy Conservation account code 60-75.

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4.4 Program Implementation and Evaluation

Presently, there is a 3 month work backlog for the natural gas conversion work. It is recommended that the proposed pilot program be initiated immediately for operation in 1991 August.

It is recommended that the performance of the vehicles used in the pilot program be monitored and evaluated over a 12 month period to permit staff to formulate an alternate fuel strategy for all Municipal vehicles. Staff will then prepare report to Council outlining the results of the evaluation and recommend a course of action.

5.0 CONCLUSION

In the 1980's Burnaby was a forerunner in examining alternative fuels for its fleets. Technology and fuel distribution system available at that time were not sufficiently reliable to justify conversion of Municipal vehicles to alternate fuel. With the changes in automobile design and the establishment of a more complete filling station network, alternative fuels usage has become a practical and cost effective alternative to gasoline.

As an interim step to large scale fleet conversion, it is recommended that Burnaby undertake a pilot program to convert 6 medium type vehicles to propane and natural gas operations (3 vehicles each). Heavy vehicles and equipment are not recommended for conversion due to substantial power loss and new factory designed fuel system that will be available in 1994. The sub-compact vehicles also are not recommended for conversion due to tank space requirement, fuelling procedures and limited improvement to fuel economy.

The proposed pilot program will be monitored over a 12 month period and a report will be forwarded to Council summarizing the results of the evaluation and recommending an overall alternate fuel strategy for Municipal operations.

The estimated capital cost of the pilot program is approximately $12,000, funds for which are currently available within the 1990-1994 Capital Budget.

DIRECTOR ENGINEERING

RGB/LSC:jb
Attach.

cc: Director Finance
Director Administrative & Community Services
Director Recreation & Cultural Services
Purchasing Agent

	Gasoline Vehicle	Propane Vehicle	Natural Gas Vehicle
Exhaust Emissions	-carbon dioxide -hydrocarbons	-lower carbon dioxide -same level of hydrocarbons as gasoline	-lower carbon dioxide and hydrocarbons
Operating Impact	-	-5% less power -slightly shorter operating range -single or dual fuel system -requires space for tank	-10% less power -operating range is half of that for gasoline -dual fuel system only -requires space for tank -longer fuelling time
Retailed Fuel Cost	-$0.60/l	-$0.27/l -$100/month/ vehicle cost saving	-$0.27/l -$110/month/vehicle cost saving
Conversion Cost	-	-$1700 per conversion plus GST	-$1400 per conversion plus GST and tank rental of $18/month
Re-Fuelling Station	-Service Centre	-7 stations in Burnaby	-2 stations in Burnaby

TABLE 1: COMPARISON OF ALTERNATIVE FUELS SYSTEM FOR MEDIUM TYPE VEHICLES