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**TO:** CITY BUILDING COMMITTEE

**SUBJECT:** ALTERNATIVE FUEL STUDY – CORPORATE FLEET

**WARD:** ALL

**PREPARED BY AND KEY CONTACT:** K. OAKLEY, P. ENG., MANAGER OF CORPORATE ASSET MANAGEMENT (EXTENSION # 4451)

**SUBMITTED BY:** K. OAKLEY, P. ENG., MANAGER OF CORPORATE ASSET MANAGEMENT

**GENERAL MANAGER APPROVAL:** A. MILLER, RPP, GENERAL MANAGER OF INFRASTRUCTURE AND GROWTH MANAGEMENT

**CHIEF ADMINISTRATIVE OFFICER APPROVAL:** M. PROWSE, CHIEF ADMINISTRATIVE OFFICER

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**RECOMMENDED MOTION**

1. That the conversion of the City’s corporate fleet to battery electric and compressed natural gas fuelled vehicles be endorsed in principle.
2. That a full time equivalent position be approved and funded beginning in November 2021, for the purpose of developing and executing an implementation plan for fleet conversion, at an estimated total cost of \$150,000 per year for salary and associated burden.
3. That staff report back in the third quarter of 2023 with an implementation plan for fleet conversion and that implementation related budget requests be included in future business plans.

**PURPOSE & BACKGROUND**

4. The purpose of this Staff Report is to respond to Council Motion 19-G-290 which in part, directed staff to “use \$75,000 from the Fleet Replacement Reserve to complete a study looking into the costs and opportunities of switching all of the City’s Corporate Vehicles (excluding transit) to electric or hybrid vehicles and report back to Council in the Fall of 2020”.
5. Staff received direction to undertake the study in late October 2019, however in early 2020 the COVID-19 pandemic delayed the procurement of a consultant. In fall of 2020, the City retained WSP to conduct the Alternative Fuel Technology Report for the City’s corporate fleet. The study was undertaken in conjunction with a similar review of the City’s transit fleet, in order to provide a coordinated view of the City’s efforts on this topic.
6. The study included a review of the make up of the City’s fleet, assessment of appropriate alternative fuels and supporting infrastructure (eg. charging and fueling stations), operating and capital costs, emissions reduction potential and implementation options.
7. Within the City’s corporate fleet, the types of vehicles and required functionality vary widely. Pick up trucks, cars, van and SUVs make up the bulk of the fleet, however a number of specialized and heavy-duty equipment such as lawn mowers, tractors, ice resurfacers, fire apparatus and plow/sander combination units are also included. Rather than focus on one type of technology conversion for the entire fleet, the initial assessment of technology looked at scenarios with varying degrees of conversion to appropriate technologies.

8. While the fleet is allocated to many City departments and distributed across a number of City facilities, the majority of the fleet is hosted at the Operations Centre, Fire Station 1, Surface Water Treatment Plant and the Wastewater Treatment Facility. For the purposes of the study, WSP focused on these 4 main facilities.
9. The completed study presents the details of one preferred scenario for fleet conversion, based on the information available at the time the work was completed. The alternative fuel industry is evolving rapidly, and regardless of the outcomes from this study and staff report, staff will monitor opportunities for fleet conversion going forward.

## **ANALYSIS**

### **Initial Technology Assessment**

10. The first part of the study focused on background review of the City's fleet and operational requirements, as well as the host facilities. High level analysis was completed on a number of scenarios, ranging from business as usual to an aggressive conversion of the entire fleet.
11. For much of the City's fleet, conversion to electric vehicles is feasible. For most heavy-duty vehicles, there are no, or very few alternative fuel options currently available, without compromising the required operational functionality.
12. The opportunity for the biggest emissions reduction is from the heavy-duty vehicles, therefore even in the most aggressive scenario, there are limitations in the potential for emissions reduction.
13. The scenario chosen for further detailed analysis (Scenario 3), was selected based on balancing functionality constraints, costs and emissions reductions. Scenario 3 includes conversion to electric wherever possible, suggests compressed natural gas for medium duty pick up trucks, and retains diesel as the fuel for the heavier duty vehicles and equipment.
14. Scenario 3 is seen as ambitious and progressive while ensuring operational functionality requirements are met.

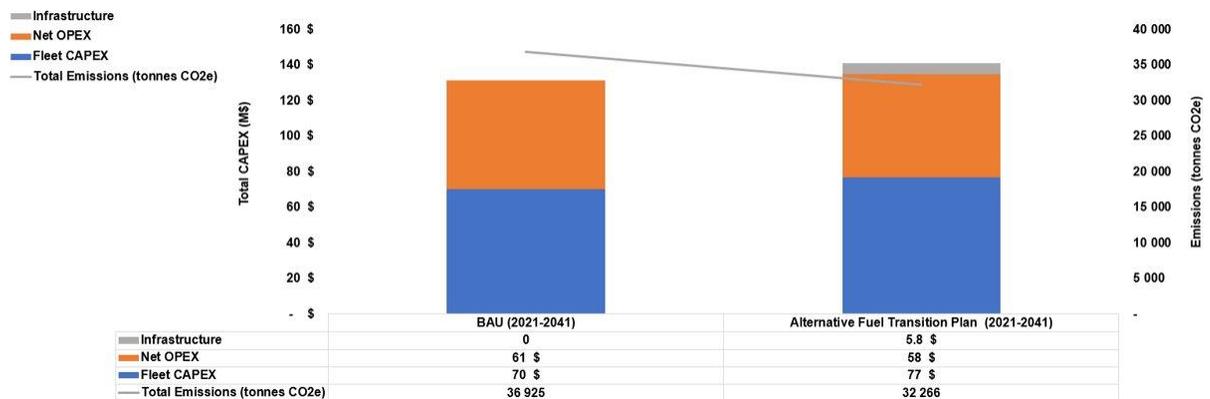
### **Facility Upgrades and Supporting Infrastructure**

15. The number of compressed natural gas vehicles to justify the capital expenditure and recurrent maintenance costs of a compressed natural gas station is usually between 20 – 30 vehicles depending on a number of factors (such as the mileage and fuel economy, the price of diesel, fuel availability etc.). As a result, adding a compressed natural gas refueling station at Station 1, the WwTF and the SWTP is not economically justifiable, and the study recommends one compressed natural gas fueling station be located at the Operations Centre. The compressed natural gas vehicles parked at other facilities will need to refuel at the Operations Centre.

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16. The Operations Centre is being redeveloped as part of a current capital project outlined in the Operations Master Plan Project. Should the City decide to proceed with the inclusion of a compressed natural gas refueling station, and electric charging stations, it is important that the current redevelopment considers requirements for operating and maintaining compressed natural gas and electric vehicles. The facilities project is currently underway, with procurement for the consultant lead and general contractor out to market. Any decisions to include natural gas fueling and electric charging stations, as well as upgrades to maintenance areas, must be incorporated as soon as possible, in order to minimize any delays to the schedule. A timely decision will have minimal impact on the design budget, but the construction budget will need to be revised since the current budget doesn't include such upgrades.
  17. Likewise, an extensive program of work is planned at the Wastewater Treatment Facility over the next 10-15 years. Should the City decide to proceed with conversion to electric vehicles, the charging infrastructure should be incorporated into the current planning and engineering. As with the Operations Centre project, the planning work is underway, and any decisions to include electric vehicle charging stations must be incorporated as soon as possible to minimize impacts to the larger project.
  18. The study also suggests charging stations for the electric vehicles would also need to be incorporated at the SWTP and Station 1. Through an implementation plan, staff would consider electric charging stations at various other facilities not included in the study, to support smaller scale conversions across the corporate fleet. As an example, in 2021, staff in Corporate Asset Management and Recreation departments are investigating options to procure electric ice resurfacers to replace existing compressed natural gas equipment that has reached end of life.
  19. The costs associated with the supporting infrastructure are incorporated into the overall costing analysis for the business as usual and Scenario 3 options.

### **Emission Reduction and Costs**

20. As previously noted, the potential for larger scale reduction in emissions is limited due to the current functionality of electric or compressed natural gas for heavy-duty vehicles. While the industry is progressing rapidly, and it's likely that over the next 20 years heavy-duty vehicles will be available for conversion, for the purposes of this study, it was assumed that heavy-duty vehicles will remain diesel.
21. Another key assumption in the report, is that conversion of fleet will occur as each vehicle reaches end of life, or as new vehicles are purchased to support growth. This results in a phased conversion over 20 years, with full emission reduction achieved at the end of that time period.
22. When compared with business as usual, the analysis shows that Scenario 3 would result in a 13% emission reduction over a 20 year period, with the maximum reduction of 25% reached in year 20. The projected emission reductions are plotted on the graph below, along with costing information.
23. Three separate cost components are considered in the analysis: capital costs of fleet vehicles, capital costs of supporting infrastructure/facility upgrades, and operating costs. The cost differences between Scenario 3 and the business as usual scenario are summarized in the graph below:



24. In general, the capital cost of alternative fuelled fleet vehicles is higher than traditional gas/diesel fuelled vehicles. The costs associated with supporting infrastructure are costs the City would only incur if the fleet were converted. Therefore overall, there is an 18% increase in capital costs associated with a converted fleet in Scenario 3, as compared to business as usual.
25. The increased capital costs are offset somewhat by a decrease in the operating expenditures in Scenario 3, relative again, to the business as usual. Fuel costs and fleet maintenance costs are anticipated to decrease in a converted fleet.
26. Overall, the net cost increase over a 20 year phased implementation of Scenario 3 is estimated to be about \$10 million, or about 7%. This costing includes the costs associated with growth of the fleet inventory to service additional population as the City grows.

### Conclusions and Next Steps

27. Conversion is technically feasible for much of the fleet; electric vehicle technology is suitable for light and some medium duty vehicles, and compressed natural gas is a good technology for the remainder of the medium duty.
28. Suitable alternatives for the heavy-duty and specialized fleet are not available at this time. The City will monitor technology changes and consider conversion of the heavy-duty and specialized fleet as part of future updates to the alternate fuel study, the implementation plan, and asset management plans.
29. There is an opportunity for the City to reduce our emissions by a modest amount, with a relatively minor increase in costs. Should the City wish to pursue this further a more detailed implementation plan is required. Preparation of an implementation plan is estimated to take 18 – 24 months and will require resourcing through a full time project manager. Once developed, execution of the program will require a project manager to lead all aspects, including the key components noted below:
  - a) Development and monitoring of a program plan, schedule and funding needs
  - b) Change management and culture shift
  - c) Engage users to define needs and confirm operational requirements
  - d) Integration with asset management planning to align end of life replacement
  - e) Pursuing grant opportunities
  - f) Training for drivers and maintenance staff
  - g) Monitor technology and industry trends

- h) Facility planning for supporting infrastructure, in particular coordination with ongoing redevelopment plans for the Operations Centre and WwTF
  - i) Managing small scale pilots
  - j) Integration with Net Zero GHG Strategy
30. Planning and executing for a program of this scale will require a dedicated resource with expertise in alternative fleet technologies and project management. Staff involved in the day to day operations and management of the City's fleet do not have the capacity or the expertise to undertake this additional work. An additional full time project manager would be required to lead these efforts and would also receive support from existing staff engaged in related capital projects, strategic planning and day to day operational activities that touch the fleet.

### **ENVIRONMENTAL AND CLIMATE CHANGE IMPACT MATTERS**

31. The following environmental and climate change impact matters have been considered in the development of the recommendation:
- a) Conversion of the City' fleet to battery electric and compressed natural gas is estimated to provide a 26% reduction of the fleet's greenhouse gas emissions by 2041. GHG are a contributor to climate change.

### **ALTERNATIVES**

32. The following alternatives are available for consideration by General Committee:

#### **Alternative #1**

General Committee could choose not to endorse the principle of fleet conversion to alternate fuels.

This alternative is not recommended as the Alternate Fuel Study demonstrates there are environmental benefits to the conversion, at minimal costs to the City. The recommendation to convert the fleet directly aligns with Council's strategic goal of Fostering a Safe and Healthy City.

#### **Alternative #2**

General Committee could alter the proposed recommendation by deferring a decision to the 2022 Business Plan discussions. If this alternative is chosen, staff would prepare an intake form for inclusion in the 2022 Business Plan.

Although this alternative is available, it would delay the work of preparing and presenting the implementation plan to Council, and any associated pilot projects. Delaying the decision on the fleet will also delay the incorporation of key design considerations into the Operations Centre redevelopment project, resulting in negative impacts on project planning and in particular the schedule.

### **FINANCIAL**

33. The costs associated with conversion of the City's fleet, and the associated fueling and charging infrastructure will be incorporated into future capital and operating budgets as the conversion is phased over time.
34. The costs associated with a full time position to develop the implementation plan, and then project manage the execution is estimated at \$150,000 per year. This report recommends the position

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begin in November 2021 and therefore this cost would be prorated for the last two months of 2021 (up to \$25,000 required in 2021).

**LINKAGE TO 2018–2022 STRATEGIC PLAN**

35. The recommendation(s) included in this Staff Report support the following goals identified in the 2018-2022 Strategic Plan:
- Fostering a Safe and Healthy City
36. The conversion of the City's fleet to alternate fuels will help build a safe and healthy City, mitigating the impact of climate change, through the reduction of greenhouse gas emissions which are a contributor to climate change.