



INFORMATION REPORT

TO:	Mayor and Members General Issues Committee
COMMITTEE DATE:	February 15, 2024
SUBJECT/REPORT NO:	Replacement of 2018 Diesel Waste Packer Equipment (PW24009) (City Wide) (Outstanding Business List Item)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Tom Kagianis (905) 546-2424 Ext. 5105
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COUNCIL DIRECTION

On January 30, 2024, Council, through the General Issues Committee (Budget) directed staff to report back on February 15, 2024 with the cost implications to the 2024 Budget of replacing the current block of nine diesel waste packer units in a like-for-like manner and the removal of the additional \$1.195M expenditure to replace 2018 diesel waste packer equipment with compressed natural gas equivalents and fuelling infrastructure as required from the 2024 tax budget, with a view to future equipment replacements using low-carbon, commercially viable equivalents including hydrogen, hybrid or battery electric options.

INFORMATION

The purpose of Information Report PW24009 – Replacement of 2018 Diesel Waste

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OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.

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Packer Equipment, is to provide the General Issues Committee with the necessary information to determine the preferred path forward for the replacement of waste packer equipment.

Several factors contribute to recommending the replacement of the 2018 diesel-powered waste packer equipment with compressed natural gas equipment. These include the current City policies and climate implications, capital and operating budget impacts, lifecycle management, available technologies and fuel options, and an existing order for compressed natural gas waste collection trucks.

The City's Waste Collections Section currently operates 37 diesel-powered trucks. Report PW22003 (approved by Council on January 19, 2022) approved the order of 10 Compressed Natural Gas Waste Collection Trucks to be received and put into service in mid to late 2024, along with single-source approval to utilize Envoy Energy Fuels Inc. for the temporary mobile fuelling station.

The 2024 budget currently identifies funds to replace the next nine diesel waste packers that have been in service since 2018 with compressed natural gas trucks. An additional 16 trucks are scheduled to be replaced in 2029 which means the procurement process would start as early as 2027.

City Policy and Climate Implications

On March 27, 2019, City Council approved (Item #3 of the Board of Health Report 19-003, March 18, 2019) an Accelerating and Prioritizing Climate Action in Response to the Climate Emergency, as well as, endorsing a clear direction from the Bay Area Climate Change Summit that allows Hamilton to meet climate change targets, notably, "that all diesel vehicles be decommissioned by 2030 and all vehicles electrified by 2050."

The Green Fleet Strategy is Fleet Services Section's direct response to the declaration of the climate emergency and was subsequently approved by Council on June 9, 2021. The request to support the investment in compressed natural gas-powered waste collection trucks is in support of the recommendation made in the Green Fleet Strategy Report to investigate the feasibility of compressed natural gas as an option to reduce greenhouse gas emissions generated from the City's fleet.

In August 2022 City Council approved Hamilton's Climate Action Strategy that includes 'ReCharge Hamilton – Our Community Energy and Emissions Plan. The Community Energy and Emissions Plan provides a low-carbon scenario to help achieve net zero by 2050. The proposed compressed natural gas waste collection trucks align with Low-Carbon Transformation #3: Changing How We Move, which will help incrementally decrease greenhouse gas emissions from our transportation sector until cleaner forms of heavy-duty vehicle technology become economically available, such as clean

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hydrogen. Recently, Term of Council priorities have accelerated the City's current Climate Change Action Strategy goal of a 50% reduction in total corporate greenhouse gas emissions from the 2005 baseline by 2030, to achieve a 55% reduction by the end of 2026.

A reduction in greenhouse gas emissions is a priority. This project will result in an annual reduction of 71 eCO₂ tonnes of greenhouse gas emissions compared to a diesel-powered truck and displaces 150,000L of diesel fuel consumption annually, or 1,050,000L over the expected seven-year life of the vehicles. 1.0L diesel fuel = 2.7kg of greenhouse gas emissions; 1.0 m³ of natural gas = 1.957kg greenhouse gas emissions).

Putting this into perspective, over the seven-year life of a diesel waste packer, 2,816 eCO₂ tonnes of greenhouse gas would be emitted, or 402 eCO₂ tonnes per year. The reduction of 71 eCO₂ tonnes equates to an 18% reduction in greenhouse gas emissions for each truck.

Additionally, natural gas-powered vehicles realize the co-benefits of up to 95% less nitrogen oxides (NO_x) compared to diesel and gasoline vehicles. Furthermore, natural gas-powered vehicles do not emit particulate matter (PM₁₀), a main cause of air pollution.

Budget Impacts

Capital:

The current 2024 Tax Budget request includes the following capital requirements to replace the nine diesel-powered waste collection trucks with compressed natural gas. Costs include:

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|------------------------------------|----------------|
| ▪ Premium to upgrade to CNG | \$1.59M |
| ▪ Expanded fuelling infrastructure | <u>\$0.30M</u> |
| ▪ Total upgrade cost for CNG | \$1.89M |

To replace the existing nine diesel-powered trucks with new diesel-powered trucks, the cost in the Proposed 2024 Capital Budget would be:

- | | |
|-------------------------------|----------|
| ▪ Cost to replace with diesel | \$0.695M |
|-------------------------------|----------|

The difference between the Proposed 2024 Tax Budget request for compressed natural gas and diesel would be a reduction in the capital requirement of \$1.195M. This reduced capital requirement would result in a lower reliance on reserve financing from the Unallocated Capital Reserve.

Operating:

The current net present value cost projections of fuel expenses by switching from diesel to compressed natural gas will save the city approximately \$500K over the seven-year life of these vehicles.

Contributions to the Fleet Replacement Reserve are based on the replacement value and the estimated service life of the vehicle. As the replacement cost of a compressed natural gas truck is greater than a diesel-powered truck, the Waste Collection Section's operating budget will be impacted by the higher contribution rates estimated at \$175K annually or \$1.225M over the life of the vehicle.

At present, the multiyear budget estimates are based on the continued purchase of diesel waste packers. Estimated fuel savings of \$500K and the annual increase to the Fleet Replacement Reserve of \$175K are not yet included in the proposed multiyear budget.

Lifecycle Management:

It is important that assets are well managed throughout their lifecycle, with most costs attributed to the operations and maintenance part of the lifecycle. Substantial costs can also be realized if assets are not renewed in a timely manner, which directly impacts costs to operate and maintain the vehicle.

Waste collection trucks are classed as severe service vehicles due to the nature of the work, which requires short bursts of acceleration followed by braking. The maintenance costs for this class of vehicle are amongst the highest in the trucking industry. Extending the vehicle's service life past seven years increases the maintenance costs by approximately 28% plus annually, or approximately \$45K per truck for one additional year, and approximately \$56K per truck for a second year. This does not include the impact on the operating department because of downtime or the cost of keeping spare vehicles to cover the anticipated downtime of existing fleet vehicles. Annual maintenance costs of a one-to-two-year-old waste collection truck range from \$10K-15K per year. It is therefore important to renew vehicles according to the estimated service life and condition.

Available Technologies and Fuel Options

Diesel Truck Product Enhancements:

Reductions to greenhouse gas emissions have been made over the years as the current diesel technology has improved. In 2027, additional improvement requirements are suspected to take effect driven by legislation that would potentially impact all of

Canada. There are still many unknowns related to these potential changes, and therefore Fleet Services continues to work with the engine manufacturers to learn more. Engine manufacturers meet emission standards at varying times and therefore it is difficult to determine the actual impact of greenhouse gas emissions without further validation. Actual emission reductions are dependent on the vehicle, and its use and can range from 1-6% of current greenhouse gas emissions.

Electric Vehicles:

Over the last few years, the development of hybrid and fully electric-powered chassis has shown a stronger presence in the market. Several cities throughout the United States and Canada are working with manufacturers to test operational requirements.

The City continues to contact industry representatives to remain current on the availability of electric vehicles in our market and has asked to be notified when demonstration models are available. The City held demonstrations and through the authorized dealer, performed route analysis on the Mack LRE to determine if the required travel distance, number of stops and payload would make this option suitable for waste collection operations. Findings through the software application have not provided consistent results. Additionally, there is a significant reduction in payload, and battery capacity is not sufficient for all routes.

These trucks require Level 3 Charging Stations which will necessitate a consultant review of the electrical infrastructure and capacity at the waste collection fleet facility at 1579 Burlington Street East. This will require several months, and the resulting costs and work could result in a cost-restrictive business case. As waste collection vehicles are severe service vehicles, delaying their replacement will result in significant maintenance costs and downtime.

The known cost of an electric waste collection truck today is approximately \$770K, including the truck(\$700K) and a Level 3 Charging Station (\$70K) for each truck. Unknown costs are electrical infrastructure requirements and the cost of the installation of charging stations.

Renewable Natural Gas:

Future options to select renewable natural gas in place of conventional compressed natural gas could reduce the carbon intensity of the fuel by 30% to 125% depending on the source of the renewal natural gas supply feedstock and associated attributes. This would potentially improve greenhouse gas emissions by a further 75% to 90% compared to diesel. The cost premium for renewable natural gas can range from 350% to 450% more than conventional compressed natural gas and would therefore need to

be reviewed from a cost-benefit perspective if this option were to be considered in the future.

Eco Diesel:

Hydrogenation-derived renewable diesel, also commonly referred to as Renewable Diesel may be available to the city this year. This fuel is a “drop-in” solution that requires no additional investment in infrastructure or truck chassis upgrades, however, it has an operational limitation based on colder temperatures.

The budget estimated premium for this fuel is currently 0.45 cents per litre with a resulting carbon intensity reduction of 85%. Discussions with fuel suppliers will continue to further understand available volumes and supply logistics.

Hydrogen:

Although a promising solution for this class of truck chassis, supply chain and vehicle availability are still very much under development. The Ontario hydrogen market is growing and heading toward more implementation as Staff continue to engage with industry contacts to learn and understand the technical and operational knowledge of this option.

Existing Order for Compressed Natural Gas Waste Collection Trucks

The purchase of 10 compressed natural gas waste collection trucks was previously approved in January 2022 per Report PW22003 - Natural Gas Waste Collection Trucks. The fuel station and truck build are both in progress.

The capital cost associated with the compressed natural gas station consists of two parts: To bridge the refuelling requirement until the new Transit Maintenance and Storage Facility at 281 Birch Avenue is operational, a temporary site at 1579 Burlington Street East will provide the required fuelling. This site will require a \$250K capital investment to provide filling posts, lighting, power supply, impact protection and other associated ancillary equipment. The cost of gas storage tanks and compressor stations will be incorporated into the cost of each m³ of natural gas purchased from the previously approved single-source vendor. Decommissioning this site is unknown currently.

A \$500K capital investment to supply and install a compressed natural gas dispenser at the new Transit Maintenance and Storage Facility currently under construction at 281 Birch Avenue. This site will be used to refuel all compressed natural gas waste collection trucks. The site is expected to be operational by 2027. Fuelling at the new Maintenance and Storage Facility at 281 Birch Avenue will reduce the fuel cost by 66%.

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Eight of the 10 trucks are expected to arrive in Q3 2024. The remaining two trucks were deferred and added to the current order of nine trucks. The deferral of the two trucks to this order is a result of the design change from a side load to a dual stream rear load truck required by the operating department.

Since the approval in January of 2022, the originally estimated value to procure the required compressed natural gas from the recommended single source supplier to refuel 10 trucks has increased by more than 200%. The negotiated contract for fuel supply is currently underway.

APPENDICES AND SCHEDULES ATTACHED

N/A