

Green Fleet Strategy

2023 Renewable Diesel Pilot Findings



BACKGROUND

The City is committed to reduce its greenhouse emissions by 60 per cent by 2030 and achieve net zero emissions by 2050. To support this, Fleet & Inventory is testing and implementing alternative fuels and technology through the Green Fleet Strategy to lower emissions across The City's fleet of vehicles and equipment. This document summarizes a small-scale renewable diesel pilot conducted in 2023.

Renewable diesel is produced by the hydrotreating of fat or oil-based feedstock. It can replace petroleum diesel without changes to fuel systems or fueling infrastructure and has the potential to reduce lifecycle greenhouse emissions, especially for vehicle classes that are difficult to electrify, such as The City's heavy-duty fleet.

PILOT OVERVIEW

Fleet & Inventory collaborated with Waste & Recycling Services to conduct a small-scale renewable diesel pilot to test the performance of renewable diesel in commercial refuse trucks. The pilot collected data to compare the use of petroleum diesel to renewable diesel in terms of operational, environmental, financial, and maintenance impacts.

RESULTS

Although the emissions coming directly from the vehicle's exhaust remain similar, the total emissions produced throughout the entire life cycle of the fuel are significantly lower. The carbon intensity of the fuel is approximately one-fourth that of traditional petroleum diesel.

Currently, renewable diesel can only be used seasonally, however, future improvements may allow year-round use of renewable diesel. If The City can use the fuel year-round, then there is the potential to cut fleet GHG emissions by 27,537 tonnes of CO₂e per year. This is the equivalent of removing about 8,000 cars off the road annually.

There were no operational or maintenance impacts from using renewable diesel in the commercial or residential refuse trucks.

KEY TAKEAWAYS

Emissions: The results showed a significant drop in the CO₂ emissions per trip using renewable diesel compared to petroleum diesel – a reduction of almost 75 per cent, even factoring in the increased fuel consumption.

Cost: The cost per litre of renewable diesel is currently more than a that of petroleum diesel. However, The City expects the incremental cost will reduce in the near future based on carbon pricing and Clean Fuel Regulations.

Operations: An increase in fuel consumption was observed, due to slightly lower energy content relative to petroleum diesel. Claims of increased DEF consumption are so far unsubstantiated, due to a gap in the data reporting. The renewable diesel currently available has a high cloud point (the temperature at which wax crystals start to form), which limits its use to the summer months. While no compatibility issues are anticipated, some engine manufacturers have not explicitly permitted its use in their engines.

NEXT STEPS

Planning for the next phase of the pilot is underway and will involve testing the fuel in a variety of vehicles and equipment for a more comprehensive evaluation in 2024. Fleet & Inventory will continue to monitor the market availability, quality and cost of renewable diesel as it is a promising pathway to achieving greatly reduced emissions in The City's fleet.

WHAT

Five trucks in the pilot group and six trucks as a control group. Trucks in both groups were new 2022 Freightliner Eonic SD trucks with Detroit DD8 engines and NTM's 42 cubic yard front-end loader refuse bodies. Renewable diesel was also used in residential refuse trucks with Cummins L9 engines.

WHEN

Renewable diesel pilot vehicles were monitored from July 25 to Sept. 22, while the petroleum diesel control group was monitored from Sept. 29 to Oct. 30, 2023. Weather conditions were similar for both periods.

WHERE

Renewable diesel was stored in a temporary tank at the Shepard Operational Workplace Centre in Calgary, Alberta.

HOW

Renewable diesel was only accessible to the pilot vehicles and data was collected from operators, fuel and vehicle monitoring systems and analyzed by Fleet & Inventory's Engineering Team.