

To: Operations & Scheduling Committee

Date: 06/01/2023

From: Marcel Longmire, Director of Maintenance

Reviewed by: *Ref*

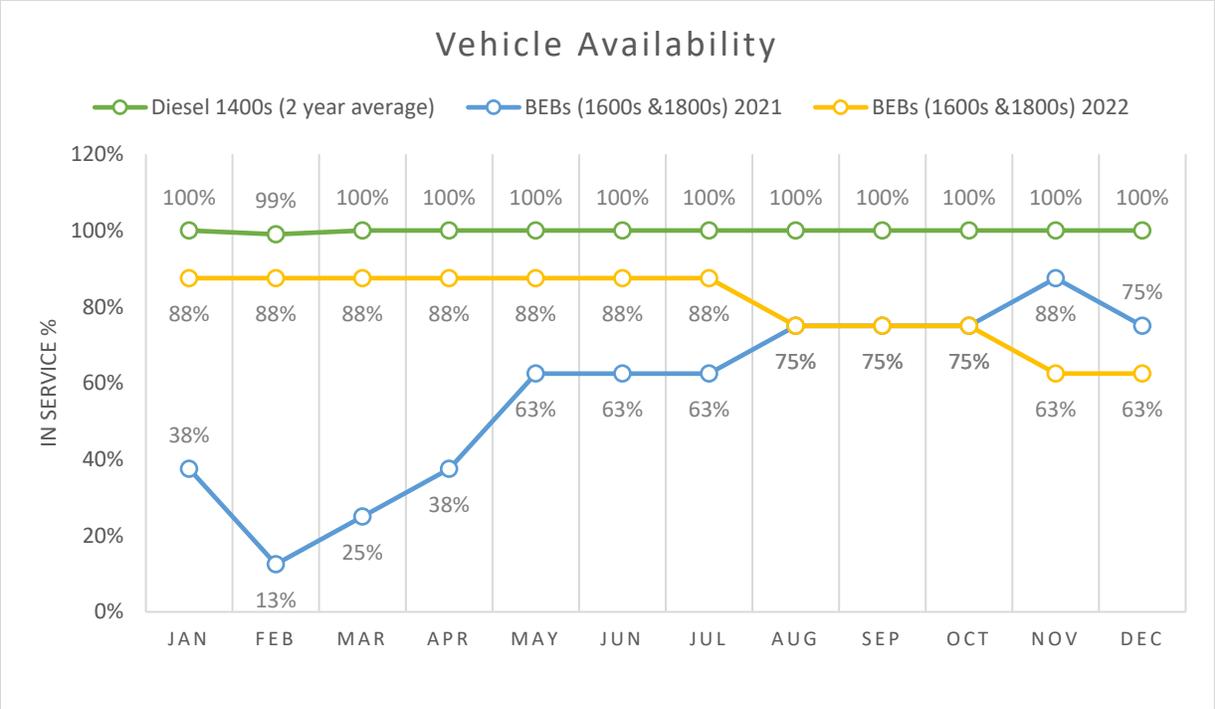
SUBJECT: Battery Electric Bus Report

Background:

County Connection has received two federal grants, the 2012 Clean Fuel Grant and the 2016 Low/No Grant, to purchase eight battery electric buses (BEBs) and the necessary charging infrastructure. All eight BEBs operate in Walnut Creek on Routes 4 and 5. Two inductive chargers were installed at the Walnut Creek BART Station to support the continuous operations on these two routes. The BEBs have travelled close to 360,000 service miles since January 1, 2017. This memo provides a comparison a comparison between the electric bus fleet and the 1400-series diesel bus fleet.

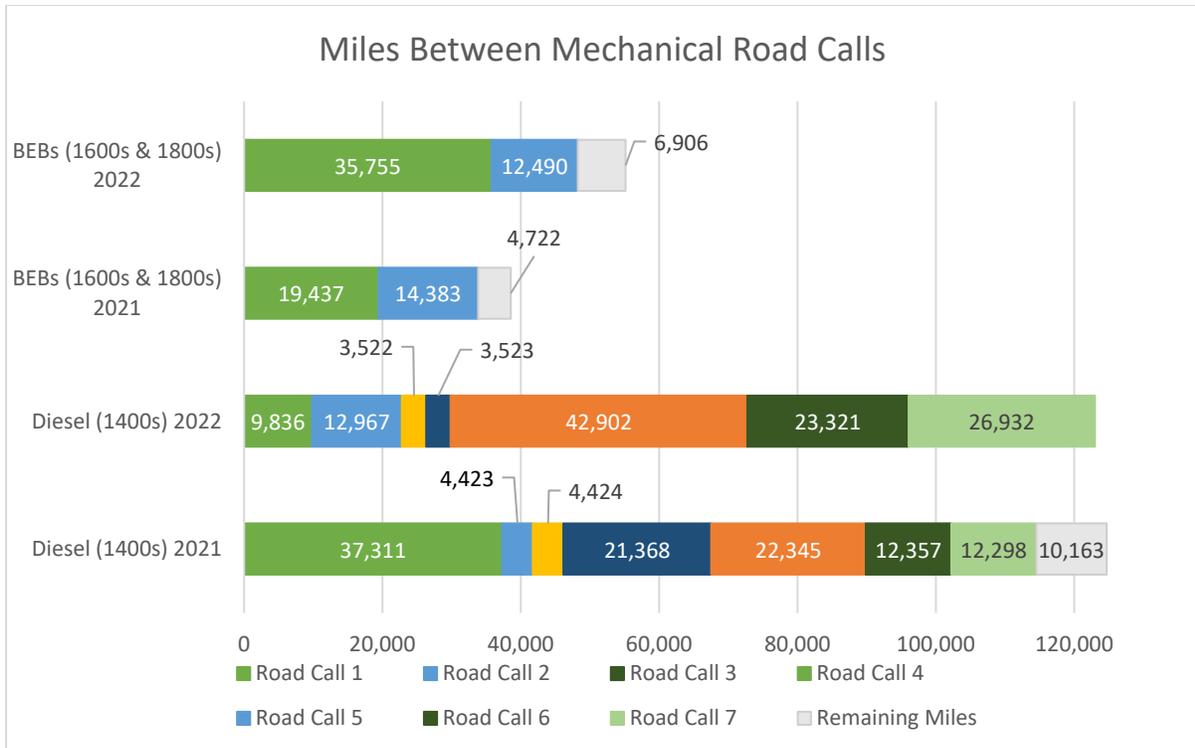
Maintenance and Operations:

As of January 2022, the electric bus availability averaged 80% up from 57% in 2021. The bus availability for the 1400-series diesel fleet was a remarkable 100% up from 98% in 2021. For the BEBs, parts availability and battery issues are still a major problem. Over the past couple of months, the BEBs ran into an issue dealing with a shortage of electronic components that has also been an industry wide problem. The vehicle availability chart on the next page tracks the annual change for the diesel and electric bus fleets.



Depot charging has also been a problem since the electric buses went into service in 2016. The biggest problem with our depot plug-in chargers was the lack of support we received from our vendor, EFACEC. The issue came to a head midway through 2021, at this point EFACEC stopped supporting their product altogether leaving us without a depot charger. With creative planning and scheduling we have been able to continue our electric bus service with just the two inductive WAVE chargers located at Walnut Creek BART. This required extensive coordination between dispatch, operators, and our maintenance department to ensure the BEBs were sufficiently charged at the beginning and end of each day. As a long-term solution, staff procured purchased two 50kW inductive WAVE chargers, which are being installed at our bus yard. These inductive charges will provide for the redundancies we previously had with the EFACEC depot chargers.

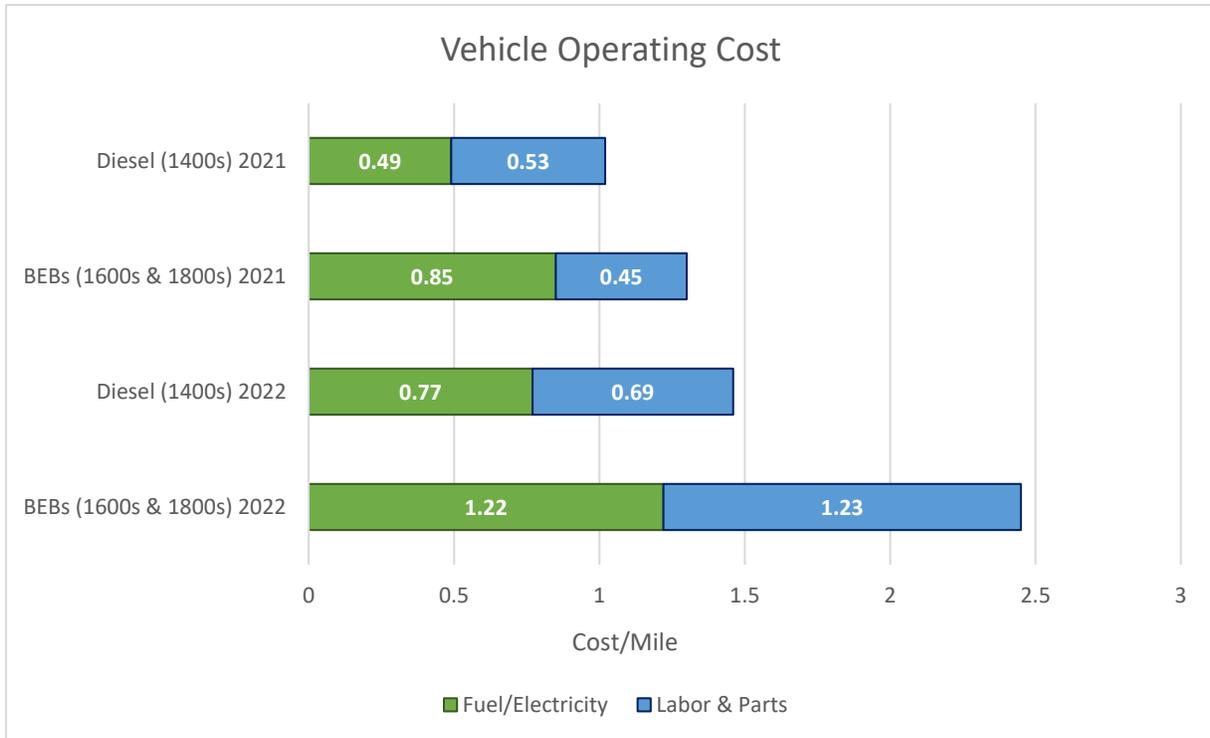
The average miles between mechanical road calls for BEBs increased from 26,500 miles in 2021 to 27,500 miles in 2022. The 1400-series diesel fleet, on the other hand, saw a decrease in the average miles between mechanical road calls, from 18,000 miles in 2021 to 17,500 miles in 2022. In 2021 and 2022, the 1400-series diesel fleet had seven road calls, compared to two road calls for the BEBs.



Cost to Operate:

As we all know, electricity rates continue to rise. This carries over to the cost of operating the BEBs. Between January 1, 2022, and December 31, 2022 the total electricity cost to operate the eight buses was about \$68,000 compared to \$62,000 in 2021.

The average energy cost per mile for battery-electric buses (BEBs) increased from \$0.86 in 2021 to \$1.22 in 2022.. The cost of diesel fuel for the 1400-series diesel fleet also increased, from \$0.49 per mile in 2021 to \$0.77 per mile in 2022. This was due to the rising cost of diesel fuel. The total cost per mile inclusive of labor and parts was \$2.45 per mile for the BEBs and \$1.46 per mile for the 1400-series diesel fleet. One of the big reasons for the extreme jump in the price for the BEBs (\$1.30 per mile in 2021) is that the BEBs are now out of warranty. Two major repairs, one being \$14,287.10 for a battery sub-pack. This sub-pack is just one of fourteen that are on each of the BEBs. The other major repair was replacing the main computer module for the battery management system at a cost of \$16,500. We expect the cost to maintain the BEB fleet will continue to rise now that the BEBs are out of warranty.



Conclusion:

Rising electricity costs and supply chain concerns continue to be a problem with the BEBs. The extremely high cost of the major components on the BEB fleet will be a big issue moving forward. Although grants were used to purchase the BEB fleet, the high cost of repair once the fleet is out of warranty is already being felt. The total cost per mile inclusive of labor and parts jumped \$1.15 in just one year.

In addition, staff expect that within the next few years all the battery packs will have to be replaced.

Financial Implications:

Ongoing maintenance.

Recommendation:

Staff recommend that the O&S Committee forward this item to the Board for review.

Action Requested:

None, for information only.