

To: Board of Directors

Date: 10/08/2018

From: Ruby Horta – Director of Planning & Marketing

Reviewed by: *W.C.*

SUBJECT: Battery Electric Bus (BEB) Update

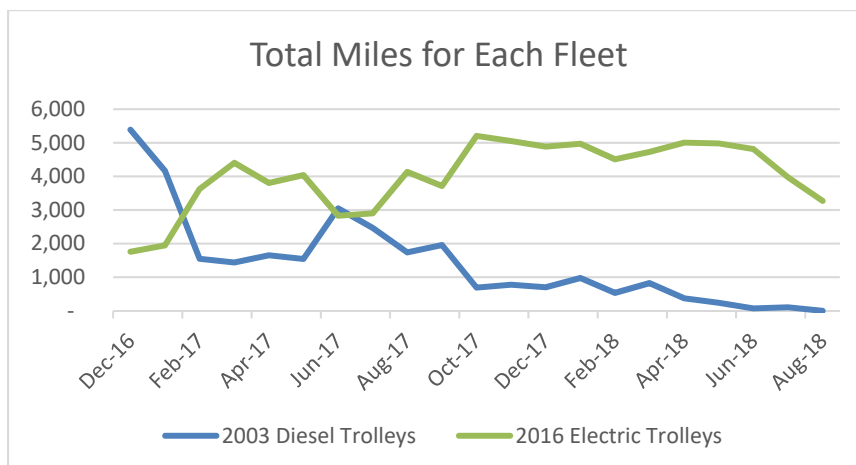
Background:

County Connection received two federal grants to purchase electric buses. The 2012 Clean Fuels grant provided funding to purchase four (4) battery electric buses (BEBs) with the trolley design and two (2) charging stations. In 2016, County Connection was awarded a Low/No grant to purchase an additional four (4) electric buses and additional charging infrastructure. The electric trolleys (fleet 1600) were delivered in 2016. We received the second set of four in 2018 (fleet 1800). All eight (8) vehicles are currently operating along Route 4. Once the new garage at Walnut Creek BART is completed, and a second inductive charger is installed, the 1800 series will provide service along Route 5.

Maintenance and Operations:

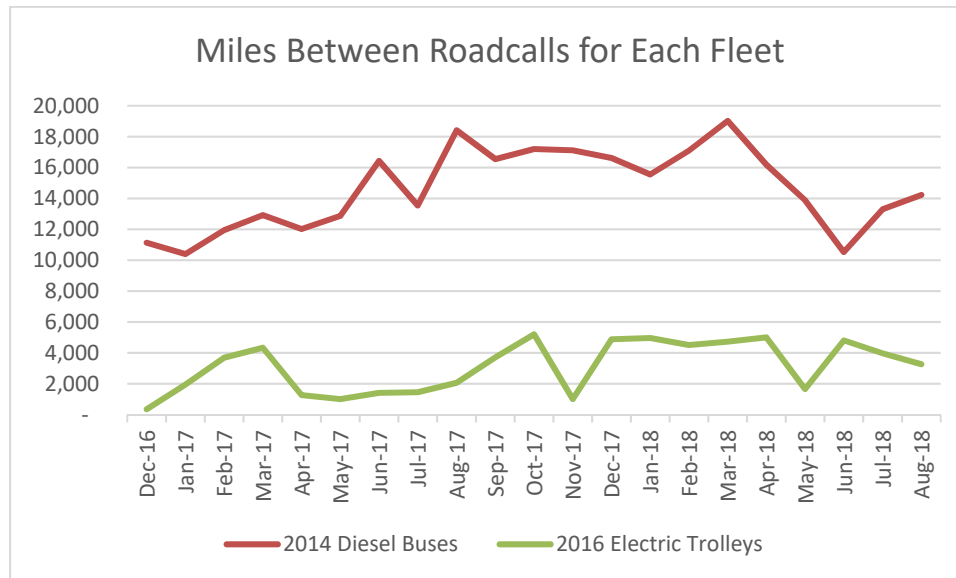
The first four electric buses (trolleys) were introduced to the fleet in December 2016. Given the classification of the project as a prototype, the FTA allowed County Connection to keep three (3) of the old diesel trolleys. This arrangement provided the protection needed to ensure service would not be interrupted on Route 4 while the electric trolleys were tested.

In the initial months, the diesel trolleys would cover service rather frequently. However, over time, the need for the reserve diesel trolleys has decreased as the electric trolleys have become more reliable. The chart below compares the total number of miles each between the 2003 diesel trolleys and the 2016 electric trolleys. In August 2018 the diesel fleet did not operate a single mile.



It should be noted, that the arrival of the 1800 series has provided additional vehicles to operate on Route 4. Currently, two (2) electric trolleys are out of service due to failures in the battery pack. They are expected to be back in service in 1-2 months.

Another important comparison is the number of the road calls mechanics must attend to for each fleet. In this case, we compared the 2014 diesel buses to the 2016 electric trolleys. The diesel buses tend to travel, on average, about 10,000 miles longer than the electric trolleys before requiring a road call.

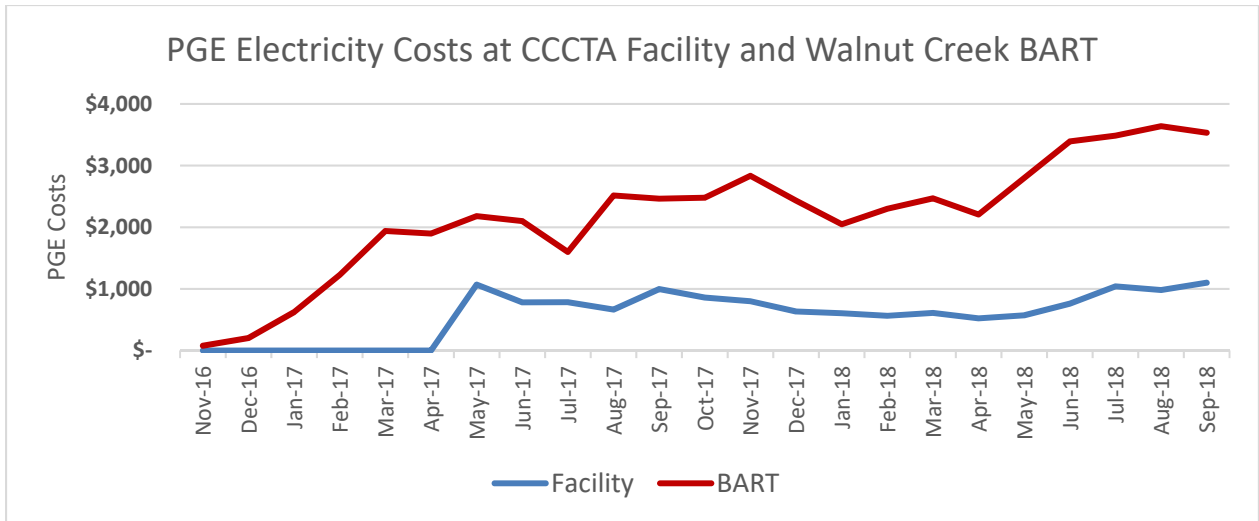


As with most new technology, there was an initial learning curve when the four (4) electric trolleys arrived. Operators had to learn new procedures, driving techniques and the importance of maintaining a certain level of charge. Maintenance staff was exposed to a completely new type of vehicle, parts and equipment. To date, the staff maintenance costs have been largely covered by warranties and the collaborative relationships with the various vendors. Additionally, the software was continually being improved to ensure the WAVE inductive charger worked on a regular basis.

Two years later, both operations and maintenance continue to learn about the technology and how best to maximize efficiencies. An area of concern is the expertise required to maintain the electric vehicles beyond the warranty period. The manufacturer currently provides electrical engineering support and it may be necessary to invest further in additional staff and/or training to ensure those needs are met.

Cost to Operate:

The electricity rates have been the major concern since implementation. Over the last two years those costs have remained relatively constant at about \$0.25/kWh in the summer and \$0.20/kWh the rest of the year. Electric bills have increased as additional electric vehicles are added. We started out with four (4) electric trolleys in 2016, and the 2018 series started arriving in May 2018 (see chart below).



The average fuel cost per mile for diesel and electric buses has not changed significantly. When last reported, the electric bus fuel cost per mile was \$0.71, today it's about \$0.67. The diesel fuel cost per mile was \$0.43 compared to \$0.40 today. This represents about a 40% difference in cost per mile. As mentioned earlier, in addition to County Connection's staff time, the electric buses also required specialty support from the various vendors. Those costs are not included in this calculation as they are currently under warranty. However, once that support stops, County Connection will be required to pay for those services or invest significantly in existing staff to ensure proper maintenance.

Conclusions:

As California moves to an all-electric future, staff will continue to report back to the Board on the progress of the electric buses. Although staff recognizes the importance of reducing greenhouse gases, there are a number considerations that should be further analyzed. For example, the existing eight (8) electric buses have a maximum range of approximately 50 miles (this assumes no energy use for heating or air conditioning). However, in order to maximize battery life, it's recommended that the bus remain above a 50% charge. Current scheduling needs on other routes require a bus to travel between 60-260 miles a day. A different type of bus and/or additional infrastructure will be required. Staff will continue to evaluate BEBs and determine an appropriate path for County Connection.

Financial Implications:

Ongoing maintenance.

Recommendation:

Information only.