

## **County of Milwaukee**

### **Interoffice Communication**

**DATE:** 5/21/2021  
**TO:** Marcelia Nicholson, Chairwoman, County Board of Supervisors  
**FROM:** Donna Brown-Martin, Director, Department of Transportation  
**SUBJECT:** Alternatively Fueled Bus Fleet

#### POLICY

Per resolution (File No. 20-850), it is Milwaukee County policy to pause acquisition of battery electric buses (BEBs) after procurement of the initial 15 BEBs to allow the Department of Transportation, Milwaukee County Transit System, and policymakers to study the efficacy and performance of BEB technology. The policy further states that the County will begin replacing diesel buses with hybrid-electric buses (Hybrids) in future capital budgets.

#### BACKGROUND

The 2019 Adopted Capital Improvements budget directed the Milwaukee County Transit System (MCTS) to initiate the transition of its vehicle fleet to battery electric buses (BEBs). Specifically, the Department of Transportation (MCDOT) and MCTS were directed to begin the pertinent facilities planning related to BEB repair and maintenance needs, utility rate-structure, and related charging infrastructure. The budget further directed the purchase of up to 15 BEBs, extending pricing for future-year purchases, and charging and infrastructure needs to accommodate the planned initial Bus Rapid Transit (BRT) bus purchase of 11 BEBs as well as at least four additional BEBs for general use. The budget provided for the possibility of seeking bids for Hybrid buses as a transitional technology.

Subsequently, MCDOT hired MJ Bradley, a strategic energy and environmental consultant, to analyze infrastructural and operational requirements for the acquisition and implementation of BEBs. MJ Bradley conducted a similar study assuming the acquisition and implementation of Hybrids, which was presented to the Transportation and Finance Committees in July of 2020.

At its December 2020 meeting, the County Board approved a resolution (File No. 20-850) that paused the procurement of any additional BEBs beyond the 15 that were already approved. The resolution directed replacement of diesel buses with Hybrids in future capital budgets along with initiation of a request for proposal (RFP) process as soon as practicable.

In accordance with the County's policy directive, MCTS is working with MJ Bradley on development of an RFP for acquisition of Hybrids. Research and analysis performed thus far indicates that acquisition and implementation of Hybrids into the MCTS fleet and route system presents more challenges than originally identified.

First is the introduction of new fuel technology (i.e., clean diesel, BEB, and Hybrid) to the fleet. To understand the depth of this challenge, it is important to note that for BEBs, 5,100 total hours of training is required and there are few mechanics who already have this training. Additionally, mechanics will be required to wear Personal Protective Equipment (PPE) when performing maintenance on BEBs to prevent electrocution. First responders will also need to wear PPE in

the event of a BEB-related accident or emergency. Milwaukee County has already committed to this technology and will be acquiring eleven of the 15 BEBs in 2022.

Hybrids maintenance is also complex as the fuel technology is comprised of battery packs, diesel engines, and electrical components. While the technology could potentially lead to an average increase in fuel efficiency of up to 15%, it is estimated that Hybrids operation along MCTS' route system would realize closer to a 6% increase in fuel efficiency due to bus idling. Geofencing is a benefit of Hybrids as the engines can be programmed for electric-only use along certain sections of a given bus route. However, because batteries degrade with use, the size of areas programmed for electric-only use become smaller and smaller over time. Two battery packs are required for geofencing at \$50,000 each. In terms of greenhouse gas emissions savings, there is no difference in output of NOx emissions between clean diesels and Hybrids as clean diesel engine emissions continue to improve from one generation to the next. For many of these reasons, the transit industry is slowly transitioning toward BEBs and away from Hybrids as an alternative to clean diesel buses.

Another significant challenge of embarking on a full fleet transition from clean diesels to Hybrids or BEBs is the cost of both infrastructure and bus procurement. The table below illustrates the difference in initial purchase costs of each vehicle type. It assumes total costs to replace 60 American Recovery and Reinvestment Act (ARRA) – era buses over two years. The bonding cap for 2021 is \$46,275,475. Even with a 3% year over year increase in the bonding cap, the purchase of Hybrids and BEBs would consume most of the available bonding over a two-year period.

**Table 1: Bus Replacement Costs by Vehicle Fuel Technology Type**

Fuel Technology	Cost / Vehicle	60-Bus Replacement Cost
Clean Diesel	\$530,000	\$31,800,000
Hybrid-Electric	\$850,000	\$51,000,000
Battery-Electric	\$1,200,000	\$72,000,000

**RECOMMENDATION**

As a result of the many substantial requirements and challenges with transitioning from clean diesels to Hybrids and/or BEBs, MCDOT recommends a three-pronged approach to bus replacement with a gradual fleet transition to BEBs as follows:

- Operation of eleven BEBs, deployed on the East-West Bus Rapid Transit route beginning in late 2022, will be considered as a one-year pilot program (approximately 4<sup>th</sup> quarter 2022 to 4<sup>th</sup> quarter 2023) with the intent to eventually acquire more BEBs for deployment on other routes. MCDOT and MCTS will report its findings to the County Board by the first quarter of 2024.
- Replacement of aging buses with clean diesels will continue until after the pilot program is completed and data is presented that will inform future County Board decisions.
- Transition from clean diesel buses to BEBs and not use Hybrids as a transition technology.

**FISCAL EFFECT**

Adoption of this recommendation will not impact bonding for 2021. It will, however, result in lower bond costs until approximately 2025.

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