

**Subject:** DES: BEB conversion cost comparison

**Related Department(s):** DES

***FY 2025 Proposed Capital Budget***

***CIP Work Session***

The following information is provided in response to a request made by Ms. Cunningham at the work session on *06/06/2024*, regarding the following question:

*Can you provide a cost comparison between the previous CIP and the proposed CIP for the conversion to battery electric buses (BEBs)?*

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While it is difficult to do an apples-to-apples comparison between the two CIPs given that they cover a different set of 10 years, the FY 2025 Proposed CIP includes close to \$143m to transition the ART Fleet to BEB versus \$61m in the FY 2023 Adopted CIP. The higher cost reflects a more complete analysis for land and build-out, as well as updated vehicle costs for Battery Electric Buses (BEBs) vs. Renewable Natural Gas (RNG) buses. The detailed costs for both the Adopted FY 2023 – FY 2032 CIP and the Proposed FY 2025 – FY 2034 CIP are included below. Both CIPs assume an annual inflation factor of 3%; the inflation factor results in the cost differential between BEB and RNG buses increasing across the 10-year CIP period. Costs continue to evolve, and assumptions will be refined following the pilot of BEBs on ART routes.

The FY 2023 – FY 2032 Adopted CIP included approximately \$61m in BEB-related cost for the ART Fleet. It included the following cost components captured in three CIP programs (Total of 84 buses):

- (1) ART Fleet Equipment & Replacement: \$37m to replace 58 buses with BEBs instead of RNG buses. It included a higher cost of about \$323K per vehicle for BEBs (total of \$1.0m per bus assumed for BEB) vs. RNGs as well as 15 additional buses procured assuming a 2:1 ratio for FY 2024 bus purchases (later years used a 1:1 ratio).
- (2) Premium Transit Network (PrTN) ART Fleet Expansion: \$4m for the incremental cost to purchase BEBs vs. RNG buses for a total of 11 expansion buses.
- (3) ART O&M Facility Electrification Phase 2: \$20m for additional charging equipment.

<i>All \$ in 000s</i>	<u>FY23</u>	<u>FY24</u>	<u>FY25</u>	<u>FY26</u>	<u>FY27</u>	<u>FY28</u>	<u>FY29</u>	<u>FY30</u>	<u>FY31</u>	<u>FY32</u>	<u>CIP Total</u>
ART Fleet Replacement		20,440		2,824	2,908		5,014		5,728		36,914
ART Fleet Expansion				2,471		1,498					3,968
AOMF Ph 2				12,000	8,000						20,000
<b>Total</b>	<b>0</b>	<b>20,440</b>	<b>0</b>	<b>17,294</b>	<b>10,908</b>	<b>1,498</b>	<b>5,014</b>	<b>0</b>	<b>5,728</b>	<b>0</b>	<b>60,883</b>

In contrast, the Proposed FY 2025 – FY 2034 CIP includes \$143m for BEB transition, including \$134m in the ART Fleet Transition to ZEB program and \$8.6m in other CIP programs as noted below:

- (1) \$134m in the ART Fleet Transition to ZEB program, which includes (total 86 buses)
  - a. Vehicles: \$73m for the incremental cost of ~\$0.5m per bus (BEB vs. RNG bus cost; \$1.2m per bus assumed for BEB) to replace a total of 55 buses and for the 11 expansion buses needed to implement the TSP. It also includes the full BEB cost for about 20 additional buses that need to be purchased owing to the 1.3:1.0 ratio assumed for BEB:RNG (as noted earlier, this assumption could be revised after more operational experience with BEBs occurs). Also captured are the mid-life battery replacements after seven years of operations at \$265K per battery.
  - b. Land: \$28m – this is a placeholder and will depend on size and location.
  - c. Infrastructure build-out, charging, etc.: \$34m
  - d. Please note the above costs in the table below are inflated annually by 3%.

<i>All \$ in 000s</i>	<u>FY25</u>	<u>FY26</u>	<u>FY27</u>	<u>FY28</u>	<u>FY29</u>	<u>FY30</u>	<u>FY31</u>	<u>FY32</u>	<u>FY33</u>	<u>FY34</u>	<u>CIP Total</u>
Vehicles: Incremental Cost											
<i>BEB vs. RNG Cost (55 buses)</i>			4,303		7,419		8,476			13,231	33,428
<i>BEB vs. RNG Cost (11 buses)</i>					3,995		2,422			0	6,416
<i>BEB cost for 20 add'l buses</i>			3,107		8,241		7,868			9,553	28,769
<i>Battery Replacement</i>								1,304	2,687		3,991
Total Vehicle Cost	0	0	7,410	0	19,654	0	18,766	1,304	2,687	22,784	72,605
Land	600	618	26,735								27,953
Build-out, charging, etc	300	312	3,775	1,104	10,889	5,474	2,508	2,459	2,533	4,264	33,618
Total	900	930	37,920	1,104	30,543	5,474	21,273	3,763	5,220	27,048	134,175

- (2) Additional costs included outside of the ART Fleet Transition to ZEB program (total 12 buses):
  - a. 4 pilot BEB buses (included in ART Fleet Expansion CIP): \$4.5m
  - b. Incremental cost of BEB vs. RNG for 8 replacement buses for FY26 (included in ART Fleet Replacement CIP): \$4.1m