

**CLIMATE CHANGE, ENERGY AND ENVIRONMENT COMMISSION**  
**c/o Department of Environmental Services**  
**2100 Clarendon Blvd., Suite 705**  
**Arlington, VA 22201**

February 27, 2023

Honorable Christian Dorsey, Chair  
Arlington County Board  
2100 Clarendon Blvd., Suite 300  
Arlington, VA 22201

Dear Chair Dorsey,

The Climate Change, Energy and Environment Commission was briefed on January 23 by Department of Environmental Services (DES) officials on the status of the ART Zero Emission Bus Feasibility Study. The Commission was alarmed by numerous aspects of the briefing and concerned that key decisions will be made based on incomplete and misleading analysis. Core areas of concern include:

- The staff briefing created a deeply flawed picture of the feasibility of battery-electric buses (BEBs) in Arlington. The staff's assumptions were outdated and not adequately disclosed, and no backup data or analysis was provided. These assumptions are highlighted in greater detail below.
- Staff proposed to delay the transition to zero emission buses (ZEBs) until at least 2028 and to buy more than 30 new Compressed Natural Gas (CNG) replacement buses between now and then. *This is contrary to specific 2021 County Board Guidance to begin the transition to zero emission buses no later than 2025. That Guidance has not been rescinded to our knowledge.*
- Staff have not provided a final written report to justify their proposed plan. The 2021 Guidance specified that any change to the Guidance must be based on a written report. DES set a deadline of year-end 2022 due to the construction schedule for the ART Operations and Maintenance Facility (AOMF). The staff's slide deck cannot be a substitute for a thorough, detailed final report.

C2E2 concludes this letter with important recommendations and a sincere request that decisions regarding the future of the ART Bus fleet be made on the basis of a balanced, expert written report with full consideration by the relevant commissions and a vote by the County Board. The delay in submitting the written report must not result in a rushed process or missed deadlines to equip the AOMF with needed charging equipment, secure funding and buy BEBs on schedule.

### **C2E2 Concerns About the Substance of Staff Briefings**

The Commission found that the PowerPoint slide deck and script used in its briefings did not adequately disclose assumptions that had a profound impact on the results presented. Important audiences, including the County Board, may have relied on this briefing without understanding the role played by these assumptions.<sup>1</sup> (See attachment for a summary of the current state of BEB technologies.)

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<sup>1</sup> In this letter we will only discuss assumptions made about BEBs. Assumptions and assertions made about hydrogen fuel cell buses and renewable natural gas also were problematic.

Examples of such assumptions include:

- The assertion that two battery buses would be required to replace every CNG bus was central to the presentation. If it were true, neither Arlington nor any other jurisdiction would transition to battery-electric buses. The cost of buses, maintenance, facilities and real estate would be prohibitive. The briefing materials did not disclose that this replacement ratio was imposed by staff as a policy preference to avoid the need to match buses to routes they can successfully complete, which is a standard practice in BEB fleet management. This policy adopted by staff is not consistent with the policy or practice of similar-sized transit agencies transitioning to BEBs. The Commission believes this policy choice should have been fully disclosed and explained to allow audiences to assess its reasonableness and its impact on the transition plan.
- The Commission found the assumption that battery technology would not improve in the future to be inconsistent with bus battery technology trends. There is extensive literature on the subject uniformly pointing toward a stream of significant advances. This has a significant impact on all projections in the briefing.
- The Commission found that the selection of a 440 kWh battery as “most appropriate for Arlington,” and the assumption that the County would continue to use that same size battery through 2038 were contrary to industry trends. That size battery is outdated and has been replaced by a 492 kWh battery in ProTerra’s ZX5 model. Many models with significantly higher range are available now, including a 738 kWh battery pack from ProTerra, which provides a 220-340 mile range depending on conditions. Range continues to improve every year.

Building one unreasonable assumption on top of another in this way creates a false picture of the feasibility of battery-electric buses in Arlington. We believe Arlington County Government can do better.

### Contextual Background

1. **The County Board has already provided clear Guidance to staff on this matter.** After careful consideration and public debate in 2021, the County Board unanimously adopted [Guidance](#) directing staff to move forward with battery-powered buses (BEBs) as the “default” and “presumed” approach for transit bus purchases. The Guidance stipulated that no more compressed natural gas (CNG) buses would be purchased once the AOMF charging infrastructure opens in 2025. This resolved a simmering debate, as Alexandria and other neighboring communities already were successfully electrifying their transit bus fleets and remain well ahead of Arlington. The County Board and DES staff agreed that an expert study should be conducted to confirm the feasibility of battery electric buses, consider alternatives, and plan the transition. The County Board indicated that it would be open to a change in approach if justified by the report.
2. **The ART Bus Zero Emissions Bus Feasibility Study is delayed.** DES, in testimony to the Board, agreed to deliver the final Feasibility Study by year-end 2022.<sup>2</sup> The end-of-year deadline was

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<sup>2</sup> See, Slide 18, “AOMF Delivery Schedule,” County Board Regular Meeting, May 14, 2022, 1:18 p.m., *available online at:* [http://arlington.granicus.com/MediaPlayer.php?view\\_id=2&clip\\_id=4095](http://arlington.granicus.com/MediaPlayer.php?view_id=2&clip_id=4095).

necessary to allow adequate time for essential decisions about a construction contract amendment to equip the AOMF for bus charging, and to order electric buses for delivery in 2025. DES testified that both of these decisions needed to take place during the first quarter of 2023. The study was initiated in 2021, as noted in the Board’s Guidance, with a consulting team from Kimley-Horn initially, later adding HDR Inc. In October 2022 the Energy Committee was told that the Study was on track for December delivery. In November the Project Director told C2E2 that the Study would slip to January. In January 2023, when asked to share the Study, the Project Director said “there is no study to share.” At that point, C2E2 learned that instead of delivering the report, staff had already completed two months of briefings of the County Board and Transportation Advisory Committee using a PowerPoint slide deck that purported to summarize findings without disclosing data, assumptions, analysis, and citations.

**3. DES staff have proposed sweeping changes that do not conform to Board Guidance.** These include:

- a. Buy 15 CNG buses as soon as possible instead of buying BEBs in 2024 as directed by Guidance. (This was described by staff as an emergency request due to high per-mile maintenance costs. This emergency appeal is not within the scope of this letter.<sup>3</sup>)
- b. Buy 16 CNG buses in 2025 and 2026 instead of buying BEBs as directed by Guidance.
- c. Cancel Guidance directive to equip the AOMF for fleet charging. Plan only to charge four “trial buses” instead.
- d. Delay any decision on transitioning the ART Fleet to zero emissions buses until 2027 or later.
- e. Delay the overall transition of the ART Fleet from 2035 (current timeline) to 2038 (proposed plan).
- f. Work in partnership with Washington Gas toward a potential trial of hydrogen fuel cell buses in 2026.

It is our understanding from staff that the Board acted only on the emergency request and that all other requests are pending submission of the draft written report and fleet transition plan tentatively scheduled for April 23. C2E2 is awaiting specific information regarding the timeline and process that will be followed to ensure public engagement and Board consideration of these complex documents.

C2E2, as the lead Commission on transportation electrification, is deeply concerned that staff were seeking to influence the Board to support changes to the 2021 Guidance without submitting the agreed-upon report. C2E2 and the Energy Committee also felt that they were not informed of significant changes in the timeline and the approach staff were taking regarding the report.

The Commission strongly supports the mission of the ART Bus system and public transportation in Arlington. They are essential to quality of life and to reducing total miles driven. The ART Bus system also is likely to be the largest single source of greenhouse gas emissions on Arlington’s roadways.

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<sup>3</sup> C2E2 was not consulted on this issue prior to decision. Maintenance costs can be quite high for parked reserve or spare buses if such costs are framed on a “per mile driven” basis.

Eliminating those emissions is feasible now and simultaneously will provide a better experience for riders and drivers and better air quality for Arlington residents.

**C2E2 Recommendations:**

1. **The County Board should require staff to abide by 2021 CIP Guidance.** That Guidance was well considered and publicly debated. That Guidance directs staff to equip the AOMF for battery electric buses, and to purchase battery electric buses for delivery in 2025 and 2026. No written report has been submitted to justify an alternative approach. According to the timeline provided by DES at the time of AOMF construction contract approval, time is now of the essence in executing the necessary contract amendment to equip the AOMF with charging infrastructure and to purchase battery electric buses for delivery in 2025. Staff should be directed to proceed with those actions or explain with clarity the implications of delaying action. The delay in submitting a report must not result in a rushed process or missed deadlines.
2. **The Board should direct staff to develop a transition plan for battery electric buses that maintains a 1:1 replacement ratio with CNG buses.**
3. **The Board should request staff to provide information to support claims and assumptions made in the briefing provided to the County Board and community.** Examples of information needed include: Revenue miles driven by each bus in service on weekdays and weekends; route block assessments identifying routes that can and cannot be successfully served by a BEB under relevant scenarios; the rationale for selecting a 440 kWh battery as the most appropriate battery size for Arlington; the rationale for assuming that buying two BEBs for every CNG bus will result in a better outcome for Arlington than matching buses to routes that they can successfully complete; the rationale for assuming that battery technology will not improve in the future; support for the claim that RNG from the Water Pollution Control Plant will be carbon negative; and the basis for the claim that electricity for fueling the ART Bus fleet will result in substantial emissions because it will be sourced from Dominion rather than from renewable sources, keeping in mind the County Government's commitment to 100% renewable electricity for County Government Operations.

We appreciate the Board's attention to this issue. We would be pleased to discuss it in greater detail at any time.

Sincerely,



Joan McIntyre  
Chair, Climate Change, Energy and Environment Commission

Cc: Mark Schwartz, County Manager  
Michelle Cowan, Deputy County Manager  
Greg Emanuel, Director, Department of Environmental Services  
Mike Moon, Chief Operating Officer, Department of Environmental Services  
Hui Wang, Transportation and Operations Bureau Chief  
Demetra McBride, Chief, Office of Sustainability and Environmental Management  
Lynne Rivers, Transit Bureau Chief  
Pierre Holloman, Assistant Transit Bureau Chief

## **Attachment**

### **Battery Electric Bus (BEB) Fact Sheet**

#### **Battery size and range**

Companies producing battery electric buses (BEBs) with improvements in efficiency that exceed the 440 kW batteries used in the analysis presented by County staff to County Commissions and the County Board include:

- The ProTerra ZX5 model has a battery capacity of 492 kWh with four battery packs on the bottom of the bus. Range for this version is 160 - 240 miles under standard test conditions.
- ProTerra's ZX5 Max 40 foot BEB is equipped with 738 kWh of battery capacity. This expanded capacity will be available in Q3 2023 and would allow for 220-340 miles of range under standard test conditions.
- Specification sheets for ProTerra models are available [here](#).
- Specification sheets for New Flyer models are available [here](#).
- Information on Gillig models is available [here](#).
- Significant battery power is consumed when using heat during cold weather. However, manufacturers such as ProTerra are now offering heat pump systems that sharply reduce the drain on batteries for heating during cold weather. According to [one study in Europe](#), buses using heat pumps reduced battery use for heating by 42 percent.
- Actual daily range of buses is a key factor in deciding between BEBs and Fuel Cell Electric Buses (FCEBs). One expert quoted [here](#) indicates that FCEBs are more suitable for routes over 450 km (270 miles) daily.

#### **Useful links for more information**

[NREL Electrifying Transit: A Guidebook for Implementing Battery Electric Buses](#)

[Will 2023 Be the Year of the Electric Mass Transit Bus?](#) Governing, February 19, 2023

[Electric or Hydrogen Buses, Who Will Win](#), Steer Group, Feb, 10, 2022

[Is Virginia Ready for More Electric Buses?](#) Greater Greater Washington, June 17, 2022

R744 CO2 Cooling Marketplace, [CO2 Heat Pumps Found to Outperform Electric Heaters in Electric Buses](#), January 25, 2022

[Montgomery County Completes Nation's Largest Bus Microgrid and Charging Project in Silver Spring](#). Oct. 31. 2022

[Montgomery County Wins \\$15M for First East Coast Hydrogen Electric Bus Project](#), August 17 2022

EPA, [An Overview of Renewable Natural Gas from Biogas](#), p. 12, Table 2, Carbon Intensity Range of Renewable CNG from Wastewater, January 2021

Vox, [The False Promise of Renewable Natural Gas](#), February 20, 2020

#### **Recent fleet studies:**

Chicago, [Charging Forward, CTA Bus Electrification Report](#) (February 2022)

Charleston, SC, [Battery Electric Bus Master Plan and Roadmap](#) (March 2022) (Fleet size: 93)