

# Battery Electric Buses Will Help Increase ART Ridership And Reduce Climate Emissions

Environmentalists and transit advocates support improving ART's current level of ridership. Replacing outdated methane (CNG) buses with clean battery electric buses (BEBs) will help meet this long-term challenge. Battery electric buses provide a reliable, quiet, non-polluting experience that riders love while simultaneously meeting Arlington's essential climate commitments.

## Reliability

- The Gillig transit bus Arlington has chosen for its pilot fleet received the highest score ever recorded by any BEB for reliability, safety and overall (89.5 out of 100) in rigorous testing conducted by the Federal Transit Administration.<sup>1</sup>
- Major advances in battery technology and charging management software have sharply reduced BEB reliability concerns in recent years.<sup>2</sup>

## Local BEB Experience is Robust

- Arlington's low speed, stop-and-go routes, small geographic area, easy terrain and modest miles-driven per bus – combined with its new state-of-the-art maintenance facility – make it one of the best-suited counties in the nation for battery electric buses.
- Alexandria DASH, a similar transit bus system next door to Arlington, has been using BEBs since 2020. At the same time, DASH is implementing the New DASH Network, a complete redesign of the existing network to make riding more convenient. DASH is now setting new ridership records.<sup>3</sup> Bus systems can reduce emissions and improve ridership at the same time.
- Most local bus systems already have placed BEBs into service. These include Metrobus (WMATA), Fairfax County, Washington DC, Montgomery County, Prince George's County and Alexandria.

## There Is No Local Hydrogen Bus Experience

- There are no hydrogen fuel cell buses (FCEBs) in service anywhere on the East Coast.
- Green hydrogen is not commercially available in this region.
- FCEBs require a large cost premium for buses, infrastructure and fuel. They are used by jurisdictions with challenging terrain or routes much longer than those in Arlington. The use case for hydrogen does not exist in Arlington.

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<sup>1</sup> See, e.g., The Independent, "Electric Bus Sets Mark for Safety, Reliability," December 28, 2022. Available online at [https://www.independentnews.com/news/livermore\\_news/electric-bus-sets-mark-for-safety-reliability/article](https://www.independentnews.com/news/livermore_news/electric-bus-sets-mark-for-safety-reliability/article).

<sup>2</sup> See, e.g., Utility Dive, "More Electric Buses Join Transit Fleets as Costs and Technology Improve," February 2, 2022. Available online at <https://www.utilitydive.com/news/more-electric-buses-arriving-in-city-transit-fleets>.

<sup>3</sup> See, e.g., "Dash Sets New Ridership Record with 4.5 Million Boardings in Fiscal Year 2023," August 1, 2023, available online at <https://www.dashbus.com/ridership-23-celebration>.

- Several large East Coast bus systems, including Montgomery County, have ordered FCEBs to serve their longest routes, although those buses are not yet in service. Montgomery County plans to produce its own green hydrogen on-site, which is not an option in Arlington due to the large acreage required.

### **RNG is Not an Acceptable Substitute for BEBs**

- Instead of buying BEBs over the next few years, staff propose to buy new CNG buses. They propose to fuel these buses with conventional fracked methane gas that has had some or all of its carbon emissions contractually offset by gas produced by concentrated animal feeding operations, sewage treatment plants and landfills (so-called renewable natural gas or RNG). There is no physical difference between the CNG the County uses now and RNG. It produces exactly the same pollution in the communities served by the bus. The methane, when it leaks from anywhere in the system, is a greenhouse gas that is 80 times more powerful than carbon dioxide over a 20-year period.<sup>4</sup>
- RNG is not an acceptable alternative to BEBs from a climate, environmental, public health or equity perspective.

### **Cost**

More than two-thirds of the up-front cost of buying BEBs typically is covered by state MERIT grants. Additional federal funding is available as well as funding from the Northern Virginia Transportation Commission. The state MERIT grant program allows funding sources to be combined to cover up to 96% of bus costs. Due to these separate dedicated funding streams, Arlington's required contribution to BEB purchase costs will be limited, while the County will benefit from low fuel and maintenance costs for the life of battery-electric buses.

### **Fleet Size**

ART can replace CNG buses with BEBs at a 1:1 ratio, meaning that no additional or "extra" buses will need to be purchased during the transition. This is true for two primary reasons:

1. ART will select BEBs with appropriate battery size and range. ART has already demonstrated this approach by selecting battery sizes of 588 kWh and 686 kWh for its initial BEBs. The estimated range for both of these batteries is over 200 miles,<sup>5</sup> far in excess of ART Bus route

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<sup>4</sup> Stanford Doerr School of Sustainability, "Methane and Climate Change," Nov. 2, 2021, available online at <https://sustainability.stanford.edu/news/methane-and-climate-change>.

<sup>5</sup> Gillig estimates the usable range of its 588 kWh battery to be 205 miles, and its 686 kWh battery to be 239 miles, according to technical qualifications submitted to potential buyers. See, e.g., <https://www.psta.net/media/5716/gillig-technical-qualifications-no-price.pdf>, at p. 105.

blocks.<sup>6</sup>

2. ART will retain a large number of CNG buses in its fleet through at least 2034.<sup>7</sup> This creates a robust “dual fuel” fleet in which CNG buses can provide coverage on the longest routes if necessary.

There is some confusion on the issue of fleet size because a draft study by Kimley-Horn consultants suggests that a replacement rate above 1:1 may be necessary. However, that study’s cost estimates and fleet size estimates are entirely based on a theoretical (modeled) fleet that consists entirely of 440 kWh batteries – an obsolete size that Arlington would never actually select.<sup>8</sup> The study also did not acknowledge that CNG buses will be available throughout the transition to cover any routes that prove challenging initially. This study has created fear and confusion due to these and many other unrealistic modeling assumptions.<sup>9</sup>

### **ART Has an Emissions Problem that Must Be Addressed**

- Each ART Bus in the fleet, including reserve buses, emits about 71 tons of greenhouse gases per year, far more than other vehicles in Arlington.<sup>10</sup>
- ART fleet emissions are higher than the emissions that would result if each passenger drove alone in an SUV.<sup>11</sup> This is a serious emissions problem that should not be minimized and must be fixed. Fixing it requires two approaches: increasing ridership over time and beginning the transition to BEBs without delay. Both solutions are necessary.
- Transit bus systems all over the country are successfully pursuing both approaches.

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<sup>6</sup> The average ART route block is 65.46 miles. Each bus drives an average total of 113 miles per day, based on a standard active-duty fleet of 63 buses. Mileage includes deadhead miles. Most buses drive a morning and afternoon route block. (Excel spreadsheet provided by ART for route blocks as of December 22, 2022.)

<sup>7</sup> ART has purchased a total of 35 new CNG buses delivered in FY23 and FY24 (on order). Minimum life for these buses is 12 years. All 35 of these buses are expected to remain in the fleet until 2035 or later.

<sup>8</sup> The 440 kWh battery was first introduced in 2017. The Kimley-Horn Study assumes that Arlington would choose that battery for all buses from 2025 through 2038. The decision to model a battery of insufficient size and assume that same battery would be ordered for 13 years is one of many profoundly unrealistic assumptions that generated a “replacement ratio” greater than 1:1. In ordering its first buses, ART wisely disregarded its own Study and purchased one battery with a 56 percent larger capacity (686 kWh), and three others with a 33 percent larger capacity (588 kWh).

<sup>9</sup> Arlington’s Climate Change, Energy and Environment Commission (C2E2) raised strong objections to the modeling assumptions in two letters to the County Board: [December 2023](#) and [February 2023](#).

<sup>10</sup> Arlington’s most recent (2016) [Greenhouse Gas Inventory](#) showed that the total ART fleet of 65 buses that year produced 4,642 tons of GHG – equal to 71.4 tons per bus.

<sup>11</sup> ART operated in 2019 at an average “diesel miles per gallon equivalent” per passenger of 9.45. This estimate is calculated by multiplying the average passenger load in 2019 (2.7) by the average diesel miles per gallon equivalent (DGE) for a CNG bus, which is approximately 3.5, according to research by the National Renewable Energy Laboratory ([NREL, 2020, Table 4.4, “Mileage, Fuel Use, Fuel Economy”](#)).

- In addition to carbon and methane pollution, CNG and RNG buses emit many other pollutants, including more than 10 times as much carbon monoxide as a diesel bus.<sup>12</sup> These pollutants impact riders, drivers and the disproportionately low-income communities they serve. RNG is not an acceptable substitute for battery electric buses.

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<sup>12</sup> U.S. Department of Energy, Argonne National Laboratory, [AFLEET Online Tool](#), Annual Air Pollutants.