

July 24, 2023

Re: Hydrogen Fuel Cell Bus Council comments in response to the Department of Energy's Office of Clean Energy Demonstration Notice of Intent OCED-NOI-23-1

From:

Hydrogen Fuel Cell Bus Council

Carter McCoy, Federal Affairs Consultant, (651) 707-6740, carter@cardinalinfrastructure.com
600 Massachusetts Ave. NW, Suite 250, Washington, DC 20001

The Hydrogen Fuel Cell Bus Council (HFCBC) is a group of public transportation agencies, hydrogen fuel cell electric bus manufacturers, hydrogen suppliers and distributors, and equipment manufacturers that advocate for the increased adoption of hydrogen fuel cell electric buses (FCEB) by engaging with stakeholders in Congress, federal agencies, and the public at-large.

The stated goals of the demand-side support mechanism identified in this NOI are to provide multi-year support for clean hydrogen produced by competitively selected projects affiliated with H2Hubs; facilitate bankable clean hydrogen demand from a diverse set of offtakers; help diverse entities leverage the full potential of clean hydrogen, including non-profits, local government, and Tribes; and facilitate the use of clean hydrogen across various sectors of the economy, such as in industrial processes, manufacturing and heavy-duty transportation.

Transit agencies make sense as a target for facilitating clean hydrogen demand. Their buses run for long periods of time, thus requiring daily refueling, and are on consistent schedules throughout the year guaranteeing reliable demand. Agencies are required to operate vehicles for their directed 12-year useful life, ensuring long-term confidence in the fuel demand for any contracts between suppliers and an agency.

Clean hydrogen has potential for significantly reducing greenhouse gas emissions from the transportation industry. According to a February 2023 report from Calstart,¹ **there were 5,480 zero-emission buses in-service or ordered in 2022**. That number is a 66% increase from 2021, but still pales in comparison to the amount of diesel and Compressed Natural Gas (CNG) buses used by transit agencies. According to the American Public Transportation Association (APTA), the approximately 6,800 public transportation agencies in the United States operated **75,000 buses that consumed 311,600,000 gallons of diesel fuel in 2021**² and 244,700,000 gallons of "other fossil fuel." With a gasoline to hydrogen conversion rate of 1.019,³ this translates to a significant demand for hydrogen per year as more agencies adopt FCEBs.

A typical diesel bus emits 229,167 lbs. of greenhouse gasses annually, while a CNG bus emits 219,083 lbs. per year and a diesel hybrid emits 163,286 lbs. per year.⁴ The California Air Resources Board (CARB) estimates that diesel particulate matter contributes to approximately 1,400 premature deaths from cardiovascular disease annually in California. There are additional effects including the onset of allergies, increased rates of asthma, lung cancer, and heart disease, and diesel soot's contribution to global

¹ Calstart, Zeroing in on ZEBs, February, 2023. https://ww2.arb.ca.gov/sites/default/files/2022-10/fy2022_23_funding_plan_appendix_d.pdf

² American Public Transportation Association, Public Transportation Fact Book, January, 2023. <https://www.apta.com/research-technical-resources/transit-statistics/public-transportation-fact-book/>

³ Department of Energy, Fuel Conversion Factors to Gasoline Gallon Equivalents, 2023. <https://epact.energy.gov/fuel-conversion-factors>

⁴ Proterra, 2023. <https://www.proterra.com/products/transit-buses/fuel-economy/>

warming.⁵ A FCEB emits zero lbs. of greenhouse gasses annually as the only output is water vapor, and when paired with a solar-powered electrolyzer to generate the fuel, the lifecycle emissions are near zero as well.

Further, CARB has identified public transportation as a commercial vehicle market segment where zero-emission technologies are most likely to succeed first and can also contribute to the development of vehicles in other segments.⁶ CARB has also mandated that transit agencies transition to zero emission vehicles by 2045, leading to swift adoption among agencies within the state.

Grants and subsidized loan funding are effective support mechanisms for demonstration, pilot-level, and scaling projects to decarbonize the transportation sector. The Low-No Grant program administered by the Department of Transportation (DOT) is the main federal funding source for zero-emission vehicles.⁷ The program recently announced the distribution of \$1.2 billion for low and zero-emission transit vehicles. For this round of funding, there were 210 applications requesting over \$4.5 billion; only 83 projects were able to receive funding from DOT, demonstrating there is significant demand that is unmet by current federal mechanisms.

A recommendation for the Department's consideration is to offset the cost differential between a battery electric bus (BEB) and a FCEB. As agencies transition to zero-emission vehicles, cost is the biggest constraint, and many are forced to go with the cheaper option, which at this point is BEBs. Zero-emission buses cost over \$1 million per vehicle to a transit agency, and the price fluctuates due to various levels of customization and technology upgrades required, as well as the specifics of contracts between agencies and manufacturers. However, the difference between a typical 40-foot BEB and FCEB is about \$300,000.⁸ Due to earlier entry into the market and investment in the technology from the federal government, BEBs have a cost advantage. If this mechanism were to fill that \$300,000 per vehicle gap, it would allow agencies to adopt the propulsion that worked best for their fleet, rather than the cheapest product. FCEBs have many benefits over BEBs including: longer ranges (FCEB are a 1:1 replacement for conventional fuel buses such as diesel or CNG), much shorter refueling times, resilience in adverse climates, and the elimination of the need for costly on-route charging facilities.

Besides direct support for capital expenditures such as vehicle procurement and equipment installation, another possible strategy is to support transit agency contracts with suppliers of hydrogen fuel by paying for the difference in the cost per kilogram. Transit agencies would benefit greatly from financial support on the operations side and would jump at the chance to take advantage of this type of demand-side support. It would also create relationships between suppliers and offtakers, further growing the network of the hydrogen economy that the Department of Energy (DOE) seeks to establish.

As referenced in this NOI, DOE's Pathways to Commercial Liftoff Report, as well as the National Clean Hydrogen Strategy and Roadmap, the lack of reliable long-term offtake is a critical barrier to the near-term expansion of the clean hydrogen economy. For the reasons listed above, HFCBC believes that investment in hydrogen fuel cell electric transit buses with the intent to increase transit agencies' profile

⁵ California Air Resources Board, Summary: Diesel Particulate Matter Health Impacts, 2023.
<https://ww2.arb.ca.gov/resources/summary-diesel-particulate-matter-health-impacts>

⁶ California Air Resources Board, Long-Term Heavy-Duty Investment Strategy, 2022.
https://ww2.arb.ca.gov/sites/default/files/2022-10/fy2022_23_funding_plan_appendix_d.pdf

⁷ Federal Transit Administration, Low- and No- Emission Grant Awards, July, 2023.
<https://www.transit.dot.gov/funding/grants/fy23-fta-bus-and-low-and-no-emission-grant-awards>

⁸ Washington State Department of Enterprise Services, Transit Bus Contract Summary, June, 2023.
<https://wades.app.box.com/s/1lbi8ibyvxzdtafzxeiy2a62jt15wi>

as offtakers of hydrogen fuel should be part of any strategy employed by DOE. This type of investment would result in successful demand formation for suppliers; significant reductions in greenhouse gas emissions from the transportation sector; increased quality of life for communities with high transit use; and the benefit of introducing the broader heavy duty vehicle market to hydrogen.

Sincerely,

Members of the Hydrogen Fuel Cell Bus Council:

Champaign-Urbana Mass Transit District, Illinois	Air Products
Foothill Transit – Covina, California	Intercity Transit – Olympia, Washington
Mass Transportation Authority – Flint, Michigan	Nel Hydrogen
NFI Group (New Flyer)	Regional Transportation Commission of Southern Nevada
Regional Transportation Commission of Washoe County, Nevada	Stark Area Regional Transit Authority, Canton, Ohio

Non-member signatories:

BayoTech	Bonneville Environmental Foundation
Kitsap Transit – Bremerton, Washington	New Day Hydrogen
Renewable Hydrogen Alliance	Twin Transit – Centralia, Washington