January 5, 2018

Director Teresa MacCartney
Georgia Governor's Office of Planning and Budget
2 Capitol Square
Atlanta, GA 30334

Submitted via email to: teresa.maccartney@opb.state.ga.us and GAVWSettlement@opb.georgia.gov

Re: Comments of Sierra Club, Environment Georgia, Southern Alliance for Clean Energy, Plug In America, and Southern Environmental Law Center on the Governor's Office of Planning and Budget's Proposed Beneficiary Mitigation Plan

Dear Director MacCartney,

Sierra Club, Environment Georgia, Southern Alliance for Clean Energy, Plug In America, and Southern Environmental Law Center (collectively, "Commenters") appreciate the opportunity to comment on the Governor's Office of Planning and Budget's ("OPB") Proposed Beneficiary Mitigation Plan Pursuant to the Environmental Mitigation Trust Agreement for State Beneficiaries ("Proposed Plan"). We thank OPB for their work on the plan to determine best uses of the Environmental Mitigation Trust ("EMT") funds, and respectfully submit these comments.

As OPB recognizes, the EMT presents Georgia with a unique opportunity to reduce NOx and other polluting vehicle emissions, to improve the health of all Georgia residents, and to accelerate the transition of our transportation sector towards cleaner, more cost-effective vehicles, which will both improve air quality and help drive economic growth in Georgia.

OPB should ensure that investments made through the EMT are forward looking, transformative, and cost-effective over vehicles' useful lives, while meaningfully reducing NOx and other polluting emissions. Given those objectives, we believe several elements of the Proposed Plan are very positive, and offer recommendations to magnify the impact of the EMT funds.

First, we offer our strong support for the following elements of the Proposed Plan:

- Commenters support OPB's proposal to spend the entirety of the mitigation funds on mitigation, rather than on administrative overhead. The entire pool of mitigation funds available to Georgia should be spent on projects to address NOx pollution, in order to maximize the benefit for Georgia residents.
- Commenters likewise support the use of mitigation funds to support electrified transportation fleets, including the proposed use of funds to replace diesel transit buses with all-electric buses.

Second, we offer the following recommendations to improve the Proposed Plan and maximize the impact of EMT funds:

- OPB should not expend any mitigation funds on diesel buses, or indeed on any fossil-fired vehicles
- OPB should prioritize electrification over alternate-fueled options. Market-ready electric technologies are available for each of the targeted vehicle segments and will meaningfully contribute to the transformation of Georgia's transportation sector;
- OPB should prioritize funding EV charging infrastructure and maximize the 15% available for such purposes. In particular, "long dwell time" locations should be prioritized for installation of Level 2 charging, like multi-unit dwellings and workplaces. DCFC charging should also be prioritized along major corridors when gaps currently exist. OPB should further partner with electric utilities to provide electricity service to sites where electric vehicle charging infrastructure will be installed in order to stretch the EMT dollars and maximize EVSE deployment.

We explain each recommendation in more detail below.

I. Funds Expended on Transit Bus Replacement Should *Only* Be Used for Electric Buses.

Although OPB rightly proposes focusing mitigation funds on replacing old and highly-polluting transit buses in the Metro Atlanta area, OPB's proposal to, in part, replace diesel transit Xpress buses with "new diesel" buses would be a misuse of mitigation funds. Instead, OPB should use funds to replace existing transit buses with electric buses only, and should in fact open up the use of funds to other bus transit systems than just the two contemplated in the proposal.

As explained more fully below, switching transit buses to electric fuel is more cost-effective on a total cost of ownership basis, and the resulting operations and maintenance ("O&M") savings allow for additional investment in clean buses while driving down costs. At the same time, electrifying bus fleets will also work to advance and transform the market, thereby contributing to already sharply falling battery and electric bus costs. Moreover, electric buses offer the most cost-effective NOx reductions, as well as the biggest reductions in air pollution and greenhouse gas emissions of available technologies.

In addition, EMT investments to electrify the metro Atlanta transit fleet would support the City of Atlanta's Climate Action Plan.[1] In recent years, fleets of similar or greater size to that of Atlanta's—including Los Angeles, New York, and Seattle—have electrified, or will electrify, parts of their bus fleets, all to positive results. Maintenance and fuel costs went down. For example, in a study done in the King County metro area in Washington, propulsion related costs for electric buses were much lower than those of diesel buses.[2] In the same study, the monthly per-mile maintenance costs of electric buses averaged $0.18/mi while diesel and hybrid buses averaged $0.32/mi and $0.44/mi, respectively.[3] In another report done by Foothill Transit, which services Los Angeles County, it was shown that electric buses in the Foothill fleet had fuel economies eight times higher than those of compressed natural gas ("CNG") buses.[4]

a. Electric buses already have lower comparative lifetime costs than diesel buses and CNG buses—and costs continue to fall sharply.

As discussed below, even today the lifetime cost of an electric bus is significantly lower than that of a new diesel or alternative fuel bus, though the upfront cost is higher. Moreover, as EV bus manufacturing scales up, and as battery costs—the most expensive part of an EV—plummet over time, electric bus prices will fall rapidly as well.

i. Electric buses have the lowest total cost of ownership.

Despite a potential up-front cost premium to purchasing an electric bus over a diesel, CNG bus or hybrid bus, (for example, a Proterra electric bus costs approximately $789,000,[5] a hybrid bus costs $673,693, a CNG bus costs $542,378, and a diesel costs $483,155[6]), even factoring in such a premium, electric buses are already a cheaper, more cost effective vehicle. As the Argonne National Laboratory's AFLEET model demonstrates,[7] electric buses already offer a total lifetime cost that is significantly lower than diesel, hybrid, and CNG alternatives. Specifically,

---

[1] City of Atlanta Climate Action Plan, July 23, 2015, *available at* http://p2catl.com/wp-content/uploads/Atlanta-Climate-Action-Plan-07-23-2015.pdf (setting targets to "Reduce GHG emissions produced by transportation 20% by 2020 and 40% by 2030").

[2] U.S. Federal Transit Administration, *King County Metro Battery Electric Bus Demonstration--Preliminary Project Results*, May 2017 (Propulsion costs include repairs for engine, fuel, exhaust, electric motors, battery modules, propulsion control, non-lighting electrical (charging, cranking, and ignition), air intake, cooling, and transmission.)

[3] *Id.*

[4] Leslie Eudy & Matthew Jeffers, *Foothill Transit Battery Electric Bus Demonstration Results: Second Report*, June 2017.

[5] *See*, *e.g.*, National Renewable Energy Laboratory, Foothill Transit Battery Electric Bus Demonstration Results: Second Report (June 2017) at 5, available at https://www.nrel.gov/docs/fy17osti/67698.pdf.

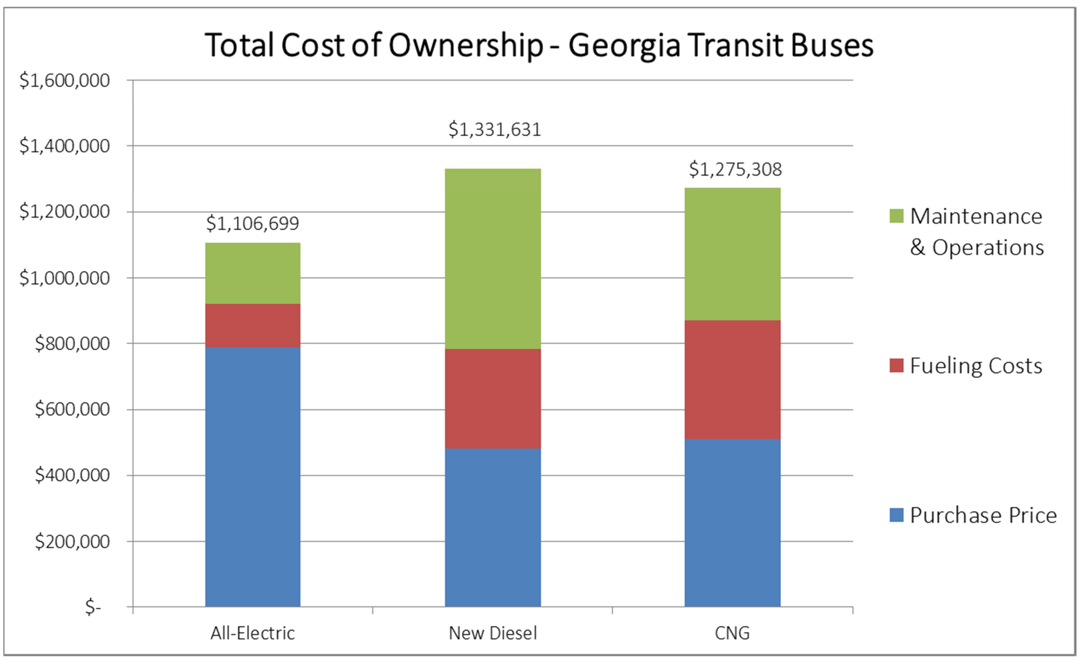
[6] *See*, *e.g.*, California Air Resources Board, Total Cost of Ownership to Advance Clean Transit (October 4, 2016) (noting the rising cost trends of fossil-fueled transit vehicles) at 9, *available at* https://www.arb.ca.gov/msprog/bus/4thactwgmtng_costs.pdf.

[7] AFLEET is a tool developed by Argonne National Lab to examine light-duty and heavy-duty vehicles' petroleum use, greenhouse gas and air pollutant emissions and costs of ownership.

nationwide per bus annual operational costs are approximately $55,000 for diesel, $90,000 for hybrid, and $72,000 for CNG. By contrast, ZEB's fuel and maintenance costs are substantially lower, at only $15,000 a year per bus.

Despite their greater purchase price, current analysis using Argonne National Laboratory's AFLEET Model demonstrates that zero emission electric buses have a **total cost of ownership 21% lower than new diesel buses.** Maintenance costs for electric buses are between 70% and 79% lower than for compressed natural gas (CNG) and new diesel buses respectively, contributing to significant cost savings over the lifetime of a bus. Based on currently reported data, each all-electric bus will save Georgia's transit agencies over $200,000 as compared to a new diesel bus purchase.

Moreover, as this electric bus technology continues to develop, all-electric bus up-front capital costs will continue to drop, whereas CNG and diesel bus capital cost trends are continually increasing.[8] In addition, a lifecycle analysis using data compiled by the California Air Resources Board in 2016 shows that hybrid diesel-electric buses have a total cost of ownership of $1,909,847, or over $700,000 greater than an electric bus.



Source: Argonne National Laboratory's AFLEET Model (2017); fuel and electricity costs adjusted for Atlanta, Georgia.

[8] California Air Resources Board. (2016) T*otal Cost of Ownership to Advance Clean Transit*. Presentation Prepared for the 4th Meeting of the Advanced Clean Transit Working Group, *available at* https://www.arb.ca.gov/msprog/bus/4thactwgmtng_costs.pdf.

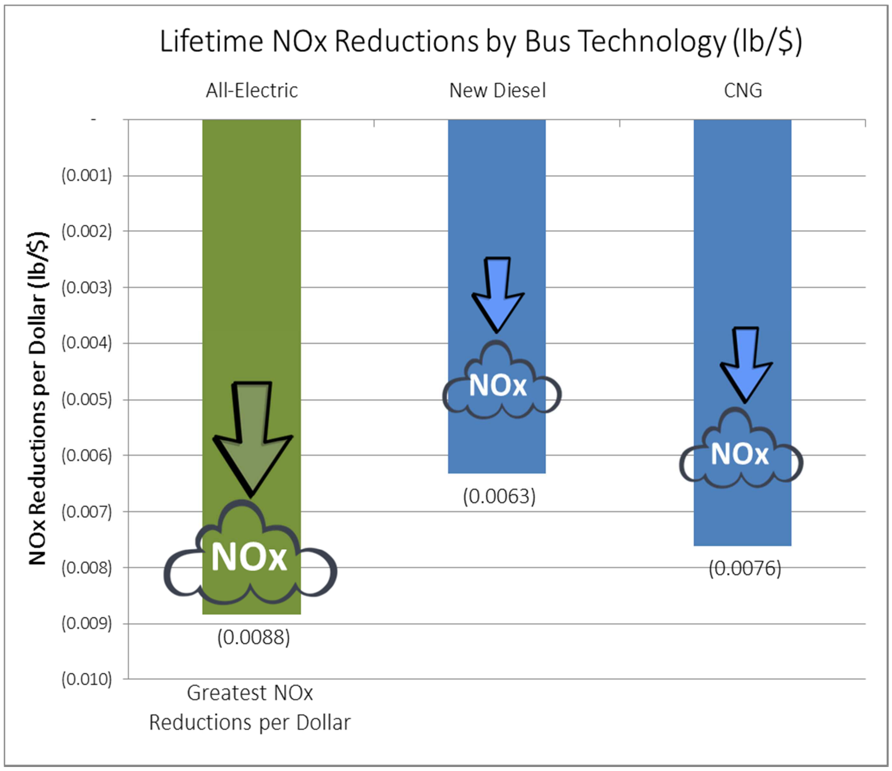
The total cost of ownership is derived from Argonne National Laboratory's AFLEET Model (2017). Fuel prices are adjusted for the Atlanta, Georgia region. Model inputs are populated using averages of fuel economy and maintenance costs reported directly by transit agencies from the years 2014 to 2017. *See* "AFLEET Inputs and Sources" attached hereto as Appendix A.

Maintenance & Fuel Costs

	Fuel Economy (MPGDE)	Maintenance & Repair ($/mi)
Electric	**19.44**	**$0.17**
Diesel	4.16	$0.80
CNG	3.87	$0.56

Maintenance and fueling expenses typically account for a significant portion of transit bus's lifetime costs. An investment in zero-emission vehicles will dramatically reduce this figure. As highlighted above, all-electric bus maintenance and repair costs are 79 and 70% lower than the maintenance and repair costs for new diesel and CNG respectively.[9] Moreover, all-electric buses are fueled by regionally-generated electricity, which has demonstrated far more reliable pricing as compared to diesel oil and natural gas.[10]

NOx Reductions (lb/$)



Specific to the Volkswagen Settlement, agencies are instructed to demonstrate their anticipated NOx reductions as a result of their state's environmental mitigation transportation investments. Many agencies are in search of the investment that results in the greatest NOx lb/$ ratio, but they are only considering the upfront purchase costs in these calculations. Accordingly, when the total lifetime costs are considered, the **bus technology with the greatest NOx lb/$ ratio is a zero-emission bus**.

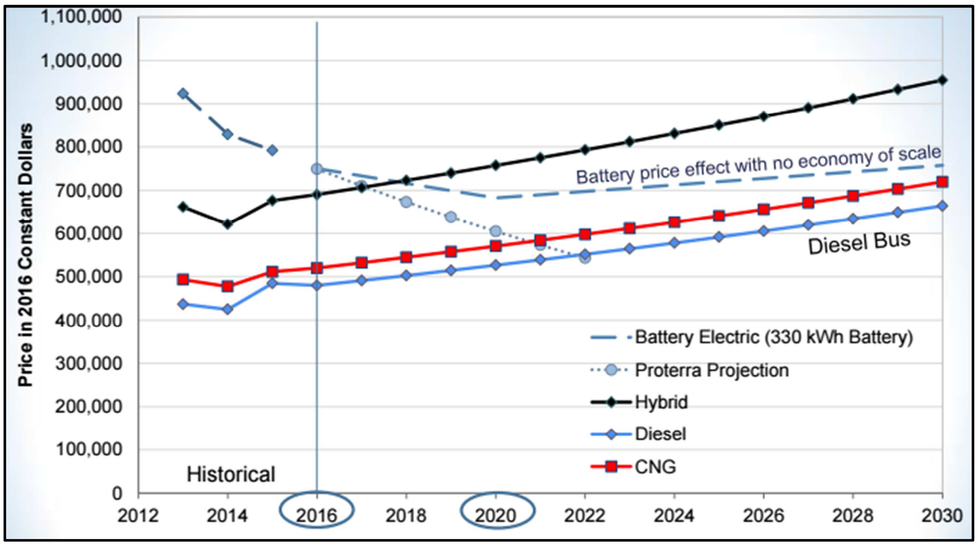
[9] Metrics derived from Argonne National Laboratory's AFLEET Model (2017) and ZEB transit studies
[10] https://www.afdc.energy.gov/fuels/prices.html.

ii. Battery costs and electric bus costs are dropping rapidly.

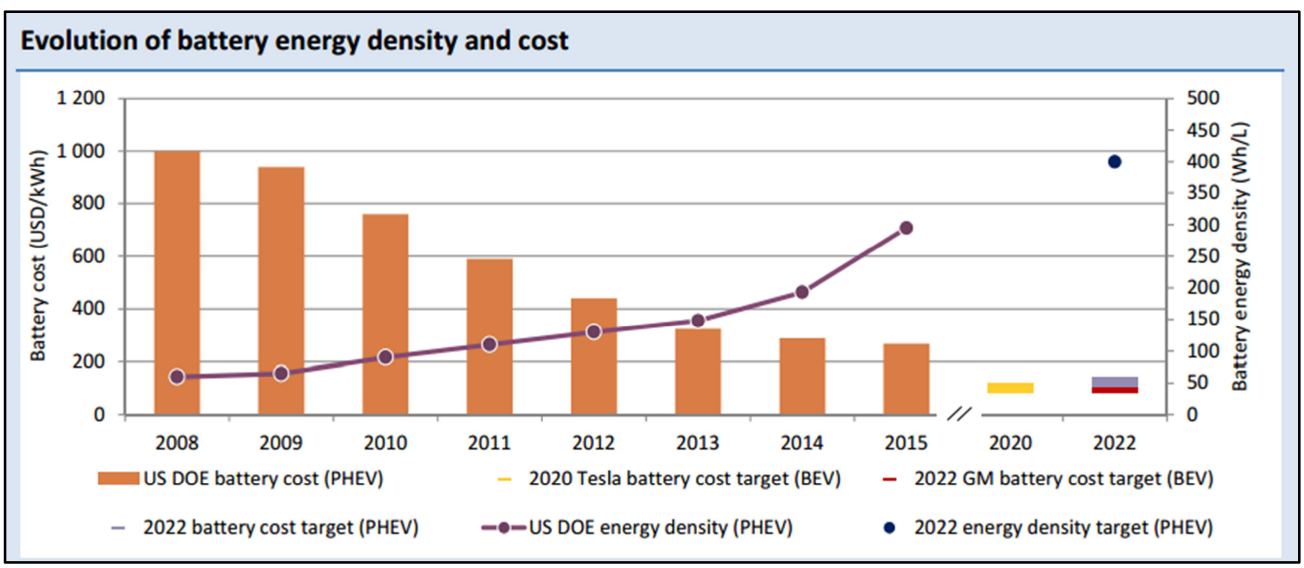
The cost premium of electric buses is dropping quickly. As manufacturing scales up, and as battery costs—the most expensive part of an EV—plummet over time, ZEB prices have and will continue to fall rapidly.

A Recent California Air Resources Board ("CARB") study shows that every year the price premium for ZEBs decreases and, by 2022, they will be at cost parity with and continue to decrease as compared to diesel buses. Therefore, every new bus bought will continue to shift the premium down. Using EMT funds to invest in electric buses now will place additional downward pressure on cost premiums and set the stage for future procurement.

Bus Price Projections (Source: Total Cost of Ownership to Advance Clean Transit, CARB 2016)



In just three years we have already seen a significant decrease in cost, and by 2022, Proterra and other electric bus companies project that battery costs will decrease by over 30 percent. Cheaper battery costs plus $40,000 in savings per year as compared to diesel buses and $57,000 per year as compared to hybrid buses make electric technology a truly cost-effective option.



b. EMT funds can be used to purchase electric buses, unlocking operations and maintenance savings that can then be used to expand an electric bus fleet, generating further savings.

EMT funds are available to meet the higher capital requirements of an electric bus fleet, allowing a transit agency to then lock in the lower lifetime costs of EV buses. The agency can then use the lifetime savings on fuel and maintenance to procure additional EV buses and build on lifetime savings going forward. For the reasons discussed above and illustrated in the example below, once costs are viewed on a lifetime basis, investing in electric buses is far preferable to diesel or CNG vehicles.

The metro Atlanta area has numerous buses that are at or near their end of their lifespans, and will need to be replaced in the near term. In the charts below, we use the AFLEET model to illustrate how the upfront cost premiums associated with electric buses are more than fully offset by lower lifetime O&M costs of electric buses in a business-as-usual ("BAU") scenario, creating savings for reinvestment even absent EMT incentives. If the EMT is used to offset upfront costs, then Georgia can lock in the lifetime savings afforded by electric buses without any additional expenditure of funds beyond what it would have to spend in a BAU context.

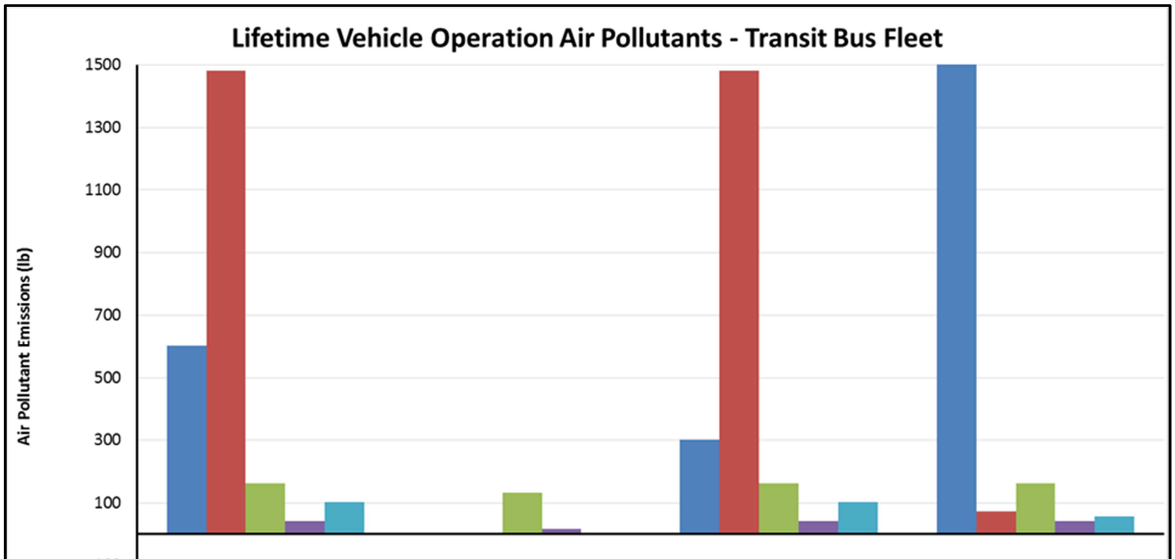
Lifetime savings can be re-invested into additional purchases of electric buses, creating a positive economic cycle, where a transit agency can continue to electrify its bus fleet, and further drive down operational costs as electric buses replace the entire fleet.

Upfront cost of electric buses relative to other technologies			
Bus Type	Diesel buses	CNG buses	Hybrid buses
Number of new buses	100	100	100
Cost to purchase 100 buses	$48,315, 500	$54,237,800	$67,369,300
Cost to purchase equivalent number of EV buses and infrastructure	$84,900,000	$84,900,000	$84,900,000
Additional cost premium for electric	**$36,584,500**	**$30,662,200**	**$17,530,700**

Operational cost savings of electric relative to other technologies			
Bus Type	Diesel buses	CNG buses	Hybrid buses
Number of new buses	100	100	100
Cost for BAU operations	$102,014,300	$122,794,500	$156,439,900
Cost for Electric Operations	$33,599,300	$33,599,300	$33,599,300
Operational cost savings for electric fleet	**$68,415,000**	**$89,195,200**	**$122,840,600**

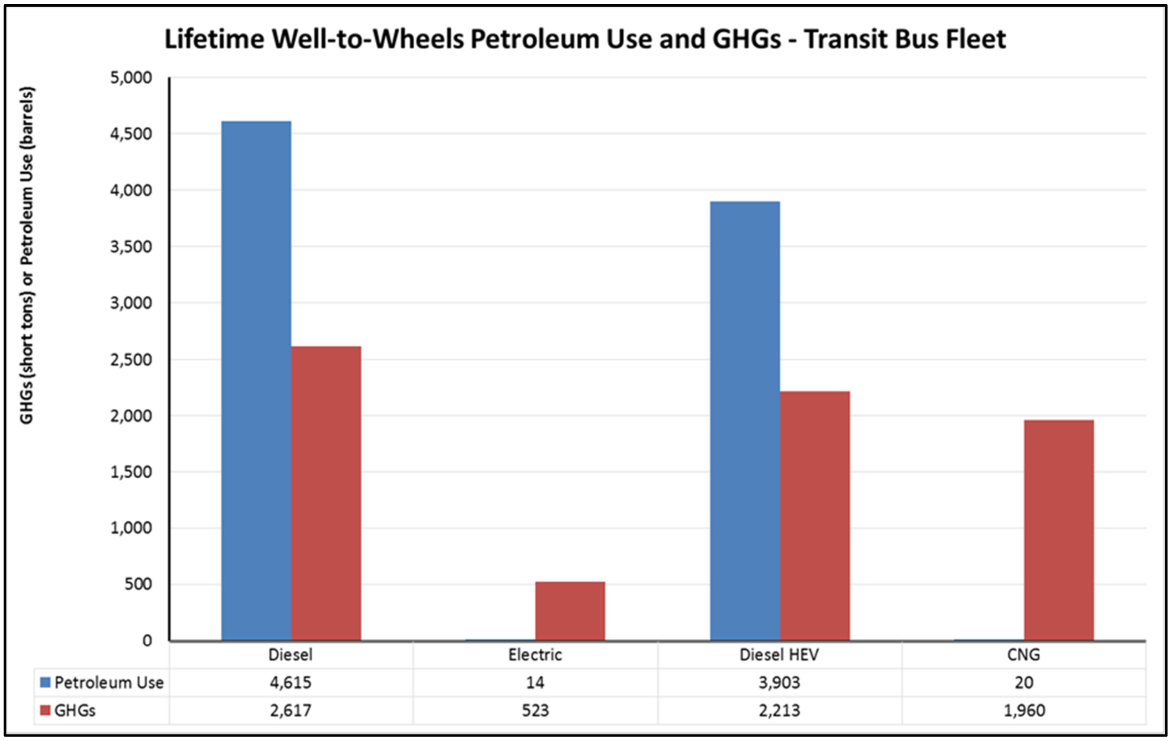
c. A switch to electric buses would deliver significant air quality and environmental benefits, addressing both critical smog and climate issues.

Electrifying Georgia buses will also deliver critical public health and environmental benefits. This is particularly important given that the Atlanta metro area struggles to comply with national ambient air quality standards for smog (ozone).[11] Below, AFLEET modeling illustrates drastic differences between lifetime emissions of criteria pollutants and greenhouse gases across electric, diesel, and CNG buses.



	Diesel	Electric	Diesel HEV	CNG
CO	602	0	301	26,711
NOx	1,482	0	1,482	74
PM10	164	134	164	164
PM2.5	43	17	43	43
VOC	103	0	103	56

[11] *See, e.g.*, monitor data for Fulton County, reported in U.S. EPA, Monitor Values Report, https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.



i. Electric buses can address the serious air pollution issues of the Atlanta metro area.

As OPB recognizes,[12] the Atlanta metro area has serious problems with ground-level ozone, or smog. Ozone is a corrosive gas that inflames the lungs, constricts breathing, and is increasingly understood to cause premature death.[13]

Smog is caused by NOx and volatile organic compounds ("VOCs"). One of the main sources of these pollutants is tailpipe emissions. Each diesel bus and each CNG bus emits a combined 1,715 pounds of NOx and VOCs over their lifetimes, but electric buses have no tailpipe emissions. While electricity from the grid to charge plug-in vehicles can result in such emissions, electric vehicles are already currently cleaner than conventional vehicles and are getting steadily cleaner in Georgia in particular as state electricity generation shifts increasingly to lower-emitting and non-emitting sources. In addition to Georgia's impressive strides to make its grid cleaner, emissions from the grid are not at street level in densely populated areas.

II. Rather Than Spend Mitigation Funds on Fossil-Fueled Buses, OPB Should Direct Funds Towards the Demonstrated, Market-Ready Electric Technologies Available for Municipal Vehicles.

Although the current proposal would direct all funds towards Atlanta transit buses, rather than spend mitigation moneys on new diesel buses, OPB should also consider directing funds towards

[12] OPB Proposed Plan at 3.
[13] *See, e.g.*, *American Trucking Ass'ns v. EPA*, 283 F.3d 355, 359 (D.C. Cir. 2002).

electrification of public vehicles, such as municipal services (garbage trucks and school buses) as well as government trucks and other vehicles. This would not only help with NOx reductions, but also offer lifetime savings to public coffers, spreading benefits statewide.

California's Air Resources Board ("ARB"), in formulating a strategy to accelerate broader transportation electrification, called for a focus on "deploying zero-emission vehicles in heavier applications that are currently well-suited for broad market development, such as transit buses, airport shuttles, and last mile delivery [trucks]"[14] in addition to continued electrification of light-duty passenger vehicles. ARB's various technology assessments have also found that these categories are ripe for electrification.[15]

a. Electric Trucks

Similar to electric buses, electric trucks are a smart option for Mitigation Trust funds and have the opportunity to provide great NOx emissions reductions for the state of Georgia. Electric medium duty trucks (Class 4-6) are widely used and in active service on the road today. With plummeting battery costs, heavy duty and long haul (Class 7 and higher) electric vehicles are already in pilots and on their way to market. Class 4-7 diesel trucks are eligible for Mitigation Trust funds. These trucks weigh between 14,001 and 33,000 lbs. and include, but are not limited to, delivery trucks, box trucks, beverage distribution trucks, rack trucks, and refuse vehicles.[16]

i. Electric trucks are already in use by businesses across America.

Staples, Frito-Lay, FedEx, UPS, and Coca-Cola are a few of the private firms that have successfully integrated on-road medium size electric trucks into their fleets. Electric medium trucks are available from Smith Electric, ZeroTruck, Boulder Electric Vehicle, EVI-USA, and Freightliner Customer Chassis Corp.[17] These companies offer a number of configurations, primarily for localized/urban (so-called "last mile") delivery and goods/refuse hauling.[18] Because of limited battery range—typically a 100-mile maximum—today's electric medium duty trucks are most effectively deployed in urban or short haul settings.[19]

---

[14] ARB, "Revised Proposed 2016 State Strategy for the State Implementation Plan" at 83.

[15] *See, e.g.*, ARB, "Draft Technology Assessment: Medium- and Heavy-Duty Battery Electric Trucks and Buses" (Oct. 2015) (noting availability of electric buses and last mile delivery trucks) (https://www.arb.ca.gov/msprog/tech/techreport/bev_tech_report.pdf); ARB, "Technology Assessment: Mobile Cargo Handling Equipment" (Nov. 2015) (https://www.arb.ca.gov/msprog/tech/techreport/che_tech_report.pdf) (noting availability of electric forklifts and other cargo handling equipment, including rubber tire gantries in particular).

[16] The Partial Consent Decree allows funding for Class 4-7 Local Freight Trucks with model years 1992-2006 unless state regulations already require upgrades to 1992-2006 model years. For a description of truck classes see Oak Ridge National Lab, 2015 Vehicle Technologies Market Report, Chapter 3: Heavy Trucks at 109 *available at* http://cta.ornl.gov/vtmarketreport/pdf/2015_vtmarketreport_full_doc.pdf.

[17] Sean Lyden, *The State of All-Electric Trucks*, Green Fleet, Jan/Feb 2014, 22 *available at* http://zerotruck.com/wp-content/downloads/GRN_medium.pdf.

[18] *See e.g.*, ZeroTruck, *Specs*, http://zerotruck.com/our-fleet/ (last visited Oct. 18, 2016); Smith Electric, *Models and Configurations*, http://www.smithelectric.com/smith-vehicles/models-and-configurations/ (last visited Oct. 18, 2016); Boulder Electric Vehicle, *Models*, http://www.boulderev.com/models.php (last visited Oct. 18, 2016); EVI-USA, *Vehicles*, http://www.evi-usa.com/PRODUCTS/Vehicles.aspx (last visited Oct. 18, 2016).

[19] *Id.*

Larger auto manufacturers are also developing these technologies to meet both growing market demand and environmental regulations. Mercedes recently unveiled its Urban eTruck concept[20] as well as its first fully electric heavy-duty truck.[21] Tesla has similarly indicated its intention to apply its all-electric technology to the heavy-duty truck market.[22] Both companies are focusing on larger Class 7/8 Heavy Duty trucks, meaning that the technology may become available within the ten-year lifespan of the Mitigation Trust.

ii. Electric trucks save money compared to their diesel counterparts.

Converting to electric medium trucks makes economic sense. A 2013 study placed the total cost savings of electric versus diesel truck ownership at 22%.[23] That study assumed a cost premium of $25,000 to $37,000 for electric compared to diesel trucks. Notably, since that study was published, battery prices have dropped from $625/kWh, the value used in the study, to under $200/kWh.[24] Because the up-front cost of an electric truck is significantly influenced by the cost of the battery pack, the study likely understates current lifetime cost savings of switching to electric trucks.

Electric delivery trucks also offer significant savings in fuel and maintenance costs as compared to diesel vehicles. Fuel cost savings from switching to electric trucks are tremendous. For example, diesel costs between $2-3 per gallon[25] and "last mile" diesel vehicles are extremely inefficient: the average fuel economy ranges from 4.6 MPG to 9.6 MPG depending on route characteristics.[26] Electricity prices average approximately $1.29 per gallon of diesel equivalent, though prices vary by region and electric utility provider. Electric delivery trucks average between 16.7 MPGe and 34.3 MPGe for those same routes.[27]

These improvements in efficiency add up to significant real world savings in fuel and maintenance costs. EVI estimates that the owner of an electric Class 6 truck should expect to spend only $2,022 per year on electricity while the owner of a similar model diesel vehicle would spend $6,036 on diesel at current prices. Over a projected ten-year lifespan, the cost

[20] Stephen Edelstein, *VW e-Crafter, Mercedes Urban e-truck concept: electric vans for Europe*, Green Car Reports, Sep. 28, 2016 http://www.greencarreports.com/news/1106348_vw-e-crafter-mercedes-urban-e-truck-concept-electric-vans-for-europe.
[21] Danielle Muoio, *Mercedes-Benz just revealed its first fully electric truck*, Business Insider, Sep. 21, 2016 http://www.businessinsider.com/mercedes-electric-urban-truck-photos-2016-9.
[22] Joseph White & Paul Lienert, *Musk 'master plan' expands Tesla into trucks, buses and car sharing*, Jul. 20, 2016 http://www.reuters.com/article/us-tesla-masterplan-idUSKCN1002Q4.
[23] Dong-Yeon Lee, et al., *Electric Urban Delivery Trucks: Energy Use, Greenhouse Gas Emissions, and Cost-Effectiveness*, Environ. Science & Tech. 47, 8022 (2013).
[24] John Voelcker, *Electric-car battery costs: Tesla $190 per kwh for pack, GM $145 for cells*, Green Car Reports, Apr. 28, 2016, http://www.greencarreports.com/news/1103667_electric-car-battery-costs-tesla-190-per-kwh-for-pack-gm-145-for-cells. The decreases have not been as significant for larger electric vehicles which rely on a different battery chemistry than electric passenger vehicles. *See* California Air Resources Board, *Technology Assessment: Medium and Heavy-Duty Battery Electric Trucks and Buses*, Draft, V-3 (Oct. 2015).
[25] Average national price as of October 3, 2016 was $2.389/gallon, but varies greatly with underlying crude oil prices, *see* http://www.eia.gov/petroleum/gasdiesel/.
[26] Electric Urban Delivery Trucks, *supra* note 9 at 8027.
[27] *Id*.

savings are even greater with an electric vehicle requiring only $17,901 of electricity versus $144,632 spent to fuel a diesel truck.[28]

Electric trucks also save significant maintenance costs over their lifetime. For example, a diesel "last mile" truck registers maintenance costs around $0.22/mile.[29] These costs include oil changes, brake repairs, belt replacements, and regular inspections. An electric delivery truck, by contrast, costs only $0.056-$0.111/mile.[30] Electric trucks simply have fewer parts to replace and repair. Additionally, electric drive trains and regenerative braking reduce wear and tear on remaining parts like brake pads. Because delivery trucks make frequent stops and travel in congested urban areas, brakes are historically one of the most frequent and expensive costs. With electric drive trains brake repairs can be reduced by 20-30%.[31]

iii. Electric trucks reduce air pollution.

Diesel powered class 4-7 trucks emit, on average, between 4.35 and 7.47 grams of NOx per mile traveled.[32] Electric vehicles have zero tailpipe emissions. Converting to electricity therefore has a significant impact on local air pollution. Additionally, from a well-to-wheels perspective, electric delivery trucks can reduce greenhouse gas emissions by 27-61%, and they keep improving their environmental performance as our electricity grids get cleaner and cleaner.[33]

Lots of pollution from class 4-7 trucks stems from their unique operational requirements. Many of these vehicles register significant idling times, during which they continue to pollute without any additional vehicle miles traveled. A diesel truck uses between 0.40 and 0.85 gallons of diesel per hour of idling.[34] This costs operators money and contributes to air pollution. To address this issue from long-haul trucks states have electrified truck stops.[35] However, this has not addressed the issue of idling in the local freight and parcel delivery fleets. It is important to address these emissions because they have a tendency to occur in populated urban and suburban settings. Electric vehicles can idle without emitting, and have more efficient start-up/shut-down abilities that may further reduce the need to idle.

b. Electric School Buses

Electric school buses present a unique and practical opportunity to reduce NOx emissions. Regrettably, children are often the most exposed and most vulnerable to diesel emissions from school buses. Children are exposed to diesel fumes while riding and getting on and off diesel

[28] Cost estimates from First Priority GreenFleet assuming national average diesel price of $2.57/gallon and electricity $0.12/kWh.
[29] *Id.* at 8025.
[30] *Id*.
[31] *Id*.
[32] U.S. EPA Office of Transportation and Air Quality, *Average In-Use Emissions from Heavy-Duty Trucks*, Oct. 2008, 5 https://www3.epa.gov/otaq/consumer/420f08027.pdf.
[33] Electric Urban Delivery Trucks, *supra* note 9 at 8028-29. This variation depends on the operational characteristics of the diesel truck being replaced. If a diesel truck runs a small route and uses less fuel/day then there are less GHGs to reduce. *Id*.
[34] Oak Ridge National Lab, 2015 Vehicle Technologies Market Report, Chapter 3: Heavy Trucks at 123 *available at* http://cta.ornl.gov/vtmarketreport/pdf/2015_vtmarketreport_full_doc.pdf.
[35] *Id.* at 124.

school buses. Asthma,[36] which diesel pollution exacerbates, is now the most common chronic condition among U.S. children, affecting 1 in 10 in the United States.

Eliminating school bus tailpipe emissions by going electric can help reduce both children's risk of developing debilitating respiratory diseases and being subjected to exacerbations of chronic lung disease like asthma.[37] These buses are also a practical end use for transportation electrification: electric school bus pilot projects currently underway in Massachusetts suggest additional cost saving opportunities such as the ability to serve as a backup source of power (vehicle-to-building technology)[38] and to sell electricity back to the grid when the vehicles are not in use, as school buses generally sit idle during the peak demand hours of the day and throughout the summer (vehicle-to-grid technology).[39]

The purchase price of electric school buses is currently about three times that of conventional buses ($300,000 versus $100,000). However, as with electric transit buses, the purchase price of these buses will continue to fall in future years as vehicle and battery prices drop. Moreover, present-day O&M savings are not exclusive to transit buses. Electric school buses are in use by a number of municipalities throughout the country[40] and are ideal fits for electrification. Buses typically operate two shifts each day, once in the morning and again in the afternoon. Down time between shifts allows buses to fully recharge. In King County, California, two electric school buses were estimated to save roughly 16 gallons of fuel per bus per day. This amounted to an annual fuel saving of over $11,000 per bus.[41]

III. OPB Should Also Direct Mitigation Funding Towards Electric Vehicle Charging Infrastructure.

Because of its potential to help deliver long-term transition in the transportation sector away from polluting fossil-fueled vehicles, Commenters support inclusion in Georgia's mitigation plan of spending 15% of the mitigation fund on electric vehicle charging infrastructure. To enable and drive EV adoption, it is critical for would-be drivers to have access to charging infrastructure that comprehensively meets their needs. Accordingly, Commenters urge OPB to use mitigation funds to supply Level 1 or Level 2 charging in places where people naturally park for extended periods and to supply DC fast charging along travel corridors to enable extended travel.

In particular, given the importance and need for additional DC fast charging in Georgia, Commenters strongly support dedicating a significant amount of this funding to the development

[36] http://www.lungchicago.org/site/files/487/54230/212503/755739/Asthma_in_Chicago_.pdf
[37] A landmark US study has also linked diesel exhaust exposure to lung cancer. https://www.ncbi.nlm.nih.gov/pubmed/22393207
[38] https://www.boston.com/cars/cars/2016/11/30/concords-electric-school-bus-is-leading-the-clean-energy-charge
[39] http://www.hybridcars.com/lion-bus-unveils-electric-school-bus-blue-bird-to-follow/
[40] *See, e.g.*, James Ayre, *Massachusetts Puts $1.4 Million into Electric School Bus Pilot Program*, Aug. 16, 2016, https://cleantechnica.com/2016/08/16/massachusetts-puts-1-4-million-electric-school-bus-pilot-project/; Nicole Schlosser, *Can Electric School Buses Go the Distance?* May 23, 2016, http://www.schoolbusfleet.com/article/713421/can-electric-school-buses-go-the-distance (providing an overview of state and local pilot projects); Larry Hall, *Tech: The Yellow School Bus Is Going All Electric*, Clean Fleet Report, Mar. 26, 2016, http://www.cleanfleetreport.com/tech-yellow-school-bus-going-electric/.
[41] Larry Hall, *Tech: The Yellow School Bus Is Going All Electric*, Clean Fleet Report, Mar. 26, 2016, http://www.cleanfleetreport.com/tech-yellow-school-bus-going-electric/.

of a statewide direct current ("DC") fast charging network. Not only is DC fast charging critical to enable inter-city or distance travel, but consumer research indicates that a "lack of robust DC fast charging infrastructure is seriously inhibiting the value, utility, and sales potential" of EVs.[42]

In addition, Commenters recommend that OPB prioritize those "long dwell time" locations where cars are most often parked and where access to charging is critical for EV ownership—the home and the workplace.[43] In particular, EMT money would be well spent on improving access to EV charging at multi-unit dwellings, where residents face unique challenges to the installation of EV charging.[44]

OPB should also devote funding towards DCFC charging along major corridors where gaps currently exist. Adoption of EVs may be hampered by fears that recharging may not be available along such corridors, and thus filling in such gaps may—for relatively little cost—have an amplified effect on EV implementation and on concomitant NOx reductions throughout the region.

Finally, Commenters recommend that OPB partners with the State's electric utilities in order to stretch the 15% allocation and maximize station deployment by using EMT funds for charging station purchase and installation, and allowing the utilities to deliver power to the site or directly to stations. This may allow managing agencies to reduce the incentive levels for corridor fast charging (currently proposed at $110 - $165k), depending on how installation costs were calculated, and better support use of the community fast charging program incentives (proposed at $22k). In many cases, the cost of installing supporting infrastructure and delivering power to charging stations is much higher than the cost of the charging station and its installation.[45] DC fast charging stations, in particular, are more likely to require new or upgraded electrical service given the high power requirement and greater likelihood of installation at more remote sites along highways. At minimum, "[i]t is important to work with the utility early in the process to minimize costs, optimize the electrical design, and eliminate scheduling bottlenecks."[46]

IV. OPB Should Provide Quarterly Open Stakeholder Engagement Opportunities and Open Statewide Project Solicitation

[42] PlugShare, New Survey Data: BEV Drivers and the Desire for DC Fast Charging (March 2014).
[43] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press at 9 (2015) (characterizing home charging as a "virtual necessity" for all EV drivers and describing the value of workplace charging).
[44] *See, e.g.*, Testimony of Douglas Jester on behalf of Sierra Club, NRDC, and ELPC at 28-29, Docket No. U-17990, Michigan Public Service Commission (filed July 2016); City and County of Denver, Department of Environmental Health and SWEEP, Opportunities for Vehicle Electrification in the Denver Metro area and Across Colorado: Overcoming Charging Challenges to Maximize Air Quality Benefits at 4 (August 2017).
[45] *See, e.g., Joint Motion for Adoption of Settlement Agreement by Pacific Gas & Electric Company et al* at 65, Case No. A.15-02-009 (filed March 21, 2016), California Public Utilities Commission; DOE, *Costs Associated With Non-Residential Electric Vehicle Supply Equipment: Factors to consider in the implementation of electric vehicle charging stations* at 17 (November 2015).
[46] DOE, *Costs Associated With Non-Residential Electric Vehicle Supply Equipment: Factors to consider in the implementation of electric vehicle charging stations* (November 2015).

The EMT provides for plan modification throughout the ten-year project period. Therefore, we believe that OPB should provide regular opportunities for project submissions and engagement by the public. The EMT also offers the opportunity for funding in all areas of the state, therefore, we recommend that a portion of Georgia's allocation should be open for solicitation to fleets outside of non-attainment areas for electrification. Many local cities throughout the state are limited in funding, but are in need of newer vehicles and equipment. Providing the opportunity for other areas to apply would enhance the used of cleaner vehicles more broadly throughout the state and offer them an opportunity to adopt new technology.

V. Conclusion.

Commenters thank OPB for the opportunity to submit these comments. We look forward to continued work with the Office and other stakeholders to support forward-looking, transformative, cost-effective uses of the Volkswagen EMT that meaningfully reduce NOx and other polluting emissions from Georgia's transportation sector.

Respectfully submitted,

/s/
Zachary M. Fabish
Senior Attorney
50 F Street, NW - 8th Floor
Washington, DC 20001
(202) 675-7917
(202) 547-6009 (fax)
zachary.fabish@sierraclub.org

Katherine Stainken
Policy Director
Plug In America
6380 Wilshire Blvd, Suite 1010
Los Angeles, CA 90048
(323) 372-1236
kstainken@pluginamerica.org

Anne Blair
Director, Clean Fuels
Southern Alliance for Clean Energy
250 Arizona Ave. NE
Atlanta, GA 30307
(404) 373-5832 x2 (office)
anne@cleanenergy.org

Brian L. Gist
Senior Attorney
Southern Environmental Law Center
Ten 10th Street NE, Suite 1050
Atlanta, GA 30309
bgist@selcga.org

Jennette Gayer
Director, Environment Georgia
108 E. Ponce De Leon Ave., Suite 210
Decatur, GA 30030
(404) 370-1764
jennette@environmentgeorgia.org

Appendix A

AFLEET Inputs and Sources:

	Maintenance ($/mi)		Fuel Economy (MPDGE)		Purchase Price ($)	
	Average	**Source(s)**	**Average**	**Source(s)**	**2015 Value**	**Source(s)**
Electric	$0.17	Foothill Transit Battery Electric Bus Demonstration (2017) Electric Buses at Stanford (2015) King County Metro Battery Electric Bus Demonstration (2017)	19.44	Foothill Transit Battery Electric Bus Demonstration (2017) Proterra Catalyst Performance Spec Sheet (2017)	$789,000	Foothill Transit Battery Electric Bus Demonstration (2017)
Diesel	$0.80	CARB Literature Review on Transit Bus Maintenance Cost (2016)	4.155	Zero Emission Bay Area (ZEBA) Fuel Cell Bus Demonstration Results: Fourth Report (2015)	$483,155	CARB Total Cost of Ownership to Advance Clean Transit (2016)
CNG	$0.56	CARB Literature Review on Transit Bus Maintenance Cost (2016)	3.87	American Fuel Cell Bus Project Evaluation: Second Report (2015) Foothill Transit Battery Electric Bus Demonstration (2017)	$509,756	CARB Literature Review on Transit Bus Maintenance Cost (2016) American Fuel Cell Bus Project Evaluation: Second Report (2015)