ELECTRIFYING NEW YORK CITY'S SCHOOL BUS FLEET: LEGAL & POLICY CONSIDERATIONS

Stephanie Thomas*

FALL 2018

* *J.D. Candidate at NYU School of Law, Class of 2020.* *I would like to thank Professor Danielle Spiegel-Feld and Professor Katrina Wyman for their guidance and useful critiques of this research paper.*

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Every year, school bus contractors drive 150,000 New York City children to school in approximately 9,000 diesel buses that harm public health and the environment. Diesel exhaust exposure increases the risk of cancer, heart disease, and respiratory symptoms, such as asthma. Exhaust and greenhouse gas emissions pollute the air and exacerbate the effects of climate change. Electric school buses offer an opportunity to eliminate these harms while providing safe, reliable transportation for schoolchildren. Despite presently high upfront costs, electric buses may also save owners money in the long-term due to reductions in fuel and maintenance costs, and the potential to save or earn money by using the buses as utility grid assets during the summer.

In light of these potential benefits, New York City should investigate the potential of electric school buses through a pilot program. A pilot would allow for monitoring of battery life and maintenance issues within the City's environment, and collaboration with Con Edison for infrastructure installation and vehicle-to-grid technology. It would also reassure families about service quality and prove to bus companies that electric buses are a worthwhile investment. Notably, White Plains, New York, Twin Rivers, California, and Amherst, Massachusetts have all launched electric school bus pilots already and the MTA is conducting a pilot electric bus program too; these pilots could serve as a model for New York City's own electric school bus pilot.

If a pilot finds that electric school buses are a promising alternative to diesel buses and the City decides it wants to require bus operators to transition towards electric vehicles, it has the legal authority to do so. Neither New York State Law nor federal law provide insurmountable hurdles to such a mandate.

The City Council has already expressed an interest in conducting a pilot and mandating an eventual transition to electric school buses. In particular, Introduction 455 of 2018 called for the oldest school buses to be replaced, beginning in 2020, with either models that use compressed natural gas ("CNG," a natural gas fuel alternative), hybrid, diesel buses that meet up-to-date admission standards, or electric engines, and that all buses be electric by 2040. Intro. 455 marks an important step forward. However, on its own, it is also an incomplete solution because it does not address the high upfront costs of electric buses or the charging infrastructure necessary to adopt an electric fleet. And without a plan to defray upfront costs and coordinate infrastructure installation, high upfront costs may incentivize companies to buy CNG or other hybrid options that do not provide the same level of environmental and health benefits, and ultimately delay fleet electrification. While there may be valid reasons to allow market choice throughout the transition period, the City Council should create the proper incentives that make choosing electric vehicles the easy choice.

I. INTRODUCTION

Every year, New York City school bus contractors drive 150,000 children to school in approximately 9,000 diesel buses.[1] These buses degrade local air quality and aggravate medical conditions, such as asthma. Transitioning towards an electric fleet could produce significant health and environmental benefits and electric vehicles are increasingly being implemented in public transportation systems in the U.S. and other countries, most prominently in China.[2]

New York City's size, resources, and commitment to environmental goals places it in position to be a market leader for electric vehicles as well. In fact, just a few months after beginning a small pilot program in January 2018, the MTA announced it would transition the entire 5,700 bus fleet to electric by 2040.[3] (See Appendix A (C)).The City should consider following suit to replace its fleet of approximately 9,000 diesel school buses with electric buses. Towards that end, this paper urges the City to implement an electric school bus pilot program, and if it proves successful and economically feasible, to pursue an electric bus requirement for all publicly contracted school buses. This is an opportunity to provide higher quality, healthier transportation to many of the City's young children while also benefitting the air quality of the region at-large. School bus electrification can also lay the groundwork for electrification of additional contracted services, including garbage and recycling collection and street sweeping. Finally, New York City can serve as a model for other cities and towns to follow at a national

[1] N.Y.C. COUNCIL, Res. 0201-2018 (2018), http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3371670&GUID=9188B3E0-1E29-4064-BA1D-924D59F47983.

[2] As of May, 2018, of the estimated 385,000 fully electric buses (not school buses specifically) worldwide, 99 percent are in China. Shenzhen, China became the first city to electrify 100 percent of its bus fleet, over 16,000 buses. Linda Poon, *How China Took Charge of the Electric Bus Revolution*, CITYLAB (May 8, 2018), https://www.citylab.com/transportation/2018/05/how-china-charged-into-the-electric-bus-revolution/559571/.

[3] Phil McKenna, *New York City Aims for All-Electric Bus Fleet by 2040*, INSIDE CLIMATE NEWS (Apr. 26, 2018), https://insideclimatenews.org/news/26042018/nyc-air-pollution-electric-bus-public-transportation-mta-clean-technology.

scale; public transit fleets are estimated to total only 70,000 buses, compared to 480,000 school buses, so the potential benefits are enormous.[4]

This paper proceeds as follows. First, in Part II, I provide background on the nature of the school bus system in New York City and recent initiatives relevant to electrifying school buses. Second, in Part III, I explain a number of benefits electric school buses will provide the City and bus riders. In Part IV, I explain the need for a pilot program, as well as the City's authority to conduct one, and discuss a number of issues the pilot should assess. Part V then considers how the City might go about implementing a requirement that all school buses used by government contractors have electric engines if the pilot is successful. Transitioning towards an electric school bus fleet presents several state and federal legal considerations regarding contract procurement and federal environmental laws, but ultimately, I conclude that a policy can be properly tailored to withstand legal challenges.

II. NEW YORK CITY'S SCHOOL BUS SYSTEM & RECENT DEVELOPMENTS

The City spends $1.2 billion per year on student busing contracts, driving 150,000 children to and from school on approximately 9,000 buses with diesel engines.[5] The City, through the Office of Pupil Transportation, under the Department of Education, contracts out for companies that provide both buses and drivers. The system is vast, with approximately sixty contractors awarded separate sets of over 8,000 routes.[6]

---

[4] Silvio Marcacci, *Electric Buses Can Save Local U.S. Governments Billions. China's Showing Us How It's Done.*, FORBES (May 21, 2018), https://www.forbes.com/sites/energyinnovation/2018/05/21/electric-buses-can-save-americas-local-governments-billions-chinas-showing-us-how-its-done/#12211ccf5f78.

[5] Res. 0201-2018, *supra* note 1.

[6] CON EDISON, *REV Demonstration Project Outline, Electric School Bus V2G*, 14 (June 8, 2018), http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b94DA14CE-371B-415B-BFBB-D54B2EFD74A1%7d. Note, using OPT data there are over 10,500 routes listed for the 2018-2019 school year, however over 1,000 have a start date of mid-September or later. It is not clear whether these are replacement routes and thus duplicates in the data. They do exclude Pre-K routes. NYC OPEN DATA, *OPT Transportation Routes*, (Last Updated Nov. 1, 2018), https://data.cityofnewyork.us/Transportation/Routes/8yac-vygm.

Unfortunately, it is also an opaque system, seemingly reliant on contract extensions and renewals that may prevent healthy market competition and fleet modernization. Around 60 percent of contracts have not been re-bid since 1979.[7] The Bloomberg administration's attempts to re-bid 40 percent of the system's contracts resulted in a protracted strike, and this year's effort to re-bid 1,600 out of 8,200 bus routes was halted by a legal challenge to the reinstatement of previously struck-down employee protection programs.[8] This fall, driver errors, failure to pick up children, and botched background checks led the schools Chancellor to call for an overhaul to the system, yet the existing contracts were still extended because of an inability to find new vendors.[9]

While criticism about the high costs, entrenched companies, and demands for change have previously failed to gain traction, there may be an opening to pursue electrification.[10] To begin with, existing bus contractors are not necessarily opposed to switching to electric buses, but they do need to see proof of the cost savings and a means to pay the upfront engine costs before they engage in the electric bus market.[11] Moreover, in 2018, Council Members introduced

---

[7] Ana Champeny, *City's Fourth Extension of the School Bus Grant Program Should Be Rejected*, CITIZENS BUDGET COMMISSION (Mar. 8, 2018), https://cbcny.org/research/citys-fourth-extension-school-bus-grant-program-should-be-rejected.

[8] Al Baker, *School Bus Drivers End Strike, in Win for New York Mayor*, N.Y. TIMES (Feb. 15, 2013), https://www.nytimes.com/2013/02/16/nyregion/school-bus-drivers-union-in-new-york-considers-ending-strike.html; L & M Bus Corp. v. New York City Dep't of Educ., 2018 N.Y. Misc. LEXIS 2363, at *23-4 (N.Y. Sup. Ct. June 14, 2018).

[9] Beenish Ahmed, *School Bus Drivers and Late and Lost in Queens*, WNYC (Sept. 19, 2018), https://www.wnyc.org/story/school-bus-drivers-are-late-and-lost-queens/; CBS NEW YORK, *NYC Embarks on New Vetting Process for School Bus Drivers*, CBS NEW YORK (Sept. 20, 2018), https://newyork.cbslocal.com/2018/09/20/nyc-school-bus-driver-vetting-background-checks-mayor-de-blasio/; Ben Chapman & Jillian Jorgensen, *NYC Families fear threat of yellow school bus strike*, NEW YORK DAILY NEWS (Oct. 11, 2018), http://www.nydailynews.com/new-york/education/ny-metro-families-fear-threat-of-yellow-bus-strike-20181011-story.html. These problems are not new. Susan Edelman, *New York City's school buses are hell on wheels*, NEW YORK POST (July 22, 2017), https://nypost.com/2017/07/22/new-york-citys-school-buses-are-hell-on-wheels/.

[10] *See, e.g.*, TRANSPORTATION NATION, *Why New York City School Busing is So Expensive*, WNYC (Jan. 22, 2013), https://www.wnyc.org/story/284319-why-new-york-city-school-busing-is-so-expensive/.

[11] For example, Logan Bus Company would like to become the first New York City bus company to use electric buses, but right now, the costs appear prohibitive. Telephone Interview with Corey Muirhead, Director of Contracts & Business Development, Logan Bus Company (Oct. 3, 2018).

draft legislation and two resolutions to electrify school buses, which clearly demonstrates an interest in the matter. First, in February, a group of eleven Council Members proposed legislation that would phase out the use of diesel buses and replace them with electric, compressed natural gas, or hybrid buses. The relevant legislation, known as Introduction 455, called for the oldest school buses to be replaced, beginning in 2020, with either models that use compressed natural gas ("CNG," a natural gas fuel alternative), hybrid, diesel buses that meet up-to-date admission standards, or electric engines, and that all buses be electric by 2040.[12] Then, in March of 2018, various council members introduced resolutions calling on New York State to pass legislation to create an "electric school bus worker cooperative program," and on the New York City Department of Education to establish a pilot worker and parent controlled cooperative that would use electric school buses.[13] Unfortunately, Intro. 455 and the resolutions are stuck in committee, where their fate is uncertain. However, in a positive development, the City Council's Committee on Environmental Protection will be holding a hearing on December 17, 2018 on Intro. 455.

New York City is committed to an ambitious goal of achieving the cleanest air quality of any large U.S. city and has promoted the use of new technologies and fuels to reduce vehicle

---

[12] N.Y.C. COUNCIL, INT. 455-2018 (2018), http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3343761&GUID=AB4AE61B-4A4D-47CB-BEBF-A5D7E6BEE6E0&Options=&Search= The alternative fuel CNG or hybrid options provided a moderate reduction in emissions and particulate levels, making them a feasible midway point. ALTERNATIVE FUELS DATA CENTER, *Natural Gas Vehicle Emissions,* U.S. Dep't of Energy (last accessed Nov. 24, 2018), https://www.afdc.energy.gov/vehicles/natural_gas_emissions.html; *see also* VEHICLE TECHNOLOGIES OFFICE OF THE U.S. DEP'T OF ENERGY, NATURAL GAS BASICS (June 2016), https://www.afdc.energy.gov/uploads/publication/natural_gas_basics.pdf. However, the expected emissions reductions from CNG buses require equal or better fuel efficiency than diesel buses. In a case where CNG buses are less fuel efficient, their overall emissions may end up equal to or even slightly higher than diesel levels. Judah Aber, *Electric Bus Analysis for New York City Transit*, COLUMBIA UNIVERSITY, 11 (May 2016), http://www.columbia.edu/~ja3041/Electric%20Bus%20Analysis%20for%20NYC%20Transit%20by%20J%20Aber%20Columbia%20University%20-%20May%202016.pdf.

[13] N.Y.C. COUNCIL, RES. 0200-2018 (2018), HTTPS://LEGISTAR.COUNCIL.NYC.GOV/LEGISLATIONDETAIL.ASPX?ID=3371655&GUID=D2950E16-F4B2-4B6F-980E-67D53D6393F4; RES. 0201-2018, *supra* note 1.

emissions for many years.[14] Several private companies with vehicle fleets, including FedEx and UPS, have been taking advantage of City and State funding incentives to begin transitioning to hybrid and electric trucks.[15] In 2015, Mayor de Blasio announced plans to replace around 2,000 city-owned, non-emergency sedans and sport utility vehicles with electric models over the next decade.[16] The next step is to combine these private and public efforts to address diesel fleets owned by private companies with government contracts. Transitioning to electric schools buses will show both a commitment to the City's environmental goals and the health and well-being of schoolchildren. Moreover, it will demonstrate to children that their schools and government take environmental sustainability and air quality seriously – that it is not just a classroom discussion.

III. THE CASE FOR ELECTRIC SCHOOL BUSES

There are four main reasons for adopting electric school buses: the public health benefits for schoolchildren and others, the safety and comfort of schoolchildren, the greenhouse gas reduction benefits, and the potential that electric school buses will be cheaper to operate than diesel-powered buses. This section reviews each of these benefits in turn.

i) Public Health Benefits

New York City school buses, like most school buses, have diesel engines, which emit exhaust that is a mixture of gases and particles.[17] Children breathe in this exhaust while riding

[14] N.Y.C. MAYOR'S OFFICE OF RECOVERY & RESILIENCY, PLANYC REPORT, 119, 122 (2007), http://www.nyc.gov/html/planyc/downloads/pdf/publications/full_report_2007.pdf.
[15] *Id*. at 125; Andrew Liptak, *UPS is hoping to convert most of its New York City fleet from diesel to electric*, THE VERGE (Nov. 11, 2017), https://www.theverge.com/2017/11/11/16638036/ups-nyserda-convert-trucks-diesel-electric-new-york-city.
[16] Michael M. Grynbaum, *New York City Aims for Vast Electric Car Fleet by 2025*, N.Y. TIMES (Dec. 1, 2015), https://www.nytimes.com/2015/12/02/nyregion/new-york-city-aims-for-a-vast-electric-car-fleet-by-2025.html.
[17] Nitrogen oxide and particulate matter (PM) are the most prevalent ingredients in exhaust, both of which are particularly toxic. ADRIANA ESPINOZA & MAHATHI VEMIREDDY, N.Y. LEAGUE OF CONSERVATION VOTERS EDUC. FUND, NEW SCHOOL YEAR, SAME DIRTY BUSES: THE CASE FOR ELECTRIFYING NEW YORK'S SCHOOL BUSES 4 (2018), http://nylcvef.org/wp-content/uploads/2018/08/ESB_WhitePaper.pdf.

the bus and sitting in city traffic, along with other concentrated pollutants from roadways. Research has found that students are exposed to higher concentration levels of these pollutants in school buses than passenger cars.[18] In addition, the majority of students in New York City who take the school bus every day are those with disabilities, who often have longer travel routes and are exposed to pollutants for longer periods of time, heightening the risks of exposure.[19]

Diesel exhaust has numerous negative health effects, including increased risk of cancer, heart disease, and respiratory symptoms, which are exacerbated in school-aged children because their lungs are still developing and their growth, inhalation, and activity rates make them more susceptible to air pollution.[20] Diesel exhaust and emissions particulates also aggravate asthma, a condition with which almost 70,000 New York City public school children (ages 5-14) had been diagnosed with by 2014, with higher rates in low-income and minority neighborhoods.[21] 20,000 of these students had persistent asthma, with symptoms occurring more than twice per week.[22] Asthma symptoms can lead to emergency rooms visits, hospitalizations, and missed school days, burdening our healthcare system, families' medical costs, and children's learning potential. These impacts are more prevalent among lower income communities and communities of color in New York City, where exposure to emissions are significantly higher and children are more likely to be diagnosed with asthma.[23] Electric engines eliminate diesel exhaust harms and

---

[18] *Id.* at 12 (citing Amanda MacMillan, *The Long Road to Safer School Buses*, NATURAL RESOURCES DEFENSE COUNCIL (Mar. 15, 2016)).
[19] *Id.* at 11.
[20] CALIFORNIA AIR RESOURCES BOARD, CHILDREN'S SCHOOL BUS EXPOSURE STUDY FACT SHEET (Oct. 2003), https://www.arb.ca.gov/research/schoolbus/sbfact.pdf (estimating that school age busing increases a child's lifetime cancer risk due to diesel particulate matter by 4%, risk of lower respiratory symptoms by 6%, and daily hospitalizations for asthma by 1%); CALIFORNIA AIR RESOURCES BOARD, CHILDREN'S SCHOOL BUS EXPOSURE STUDY, 3 (Oct. 2003), https://www.arb.ca.gov/carbis/research/schoolbus/report.pdf; ESPINOZA & VEMIREDDY, *supra* note 17, at 12 (describing the impacts of diesel pollution on the risk of developing cancer or affecting the respiratory or cardiovascular system, and the increased susceptibility of children to such impacts).
[21] N.Y.C. DEP'T OF HEALTH, ENVTL. & HEATH DATA PORTAL, http://a816-dohbesp.nyc.gov/IndicatorPublic/VisualizationData.aspx?id=2147,4466a0,11,Summarize.
[22] *Id*. at http://a816-dohbesp.nyc.gov/IndicatorPublic/VisualizationData.aspx?id=2149,4466a0,11,Summarize.
[23] ESPINOZA & VEMIREDDY, *supra* note 17, at 6–8.

associated costs. It has been estimated that electrifying MTA buses would save $150,000 per year per bus, or $100 per New York City resident, using EPA's Diesel Emissions tool.[24]

ii) Safety and Comfort of Schoolchildren and Drivers

The elimination of loud, noisy engines creates a better rider experience. A quieter bus environment could reduce driver distractions, and thus potentially the risk of accidents.[25] The driver would also be better able to hear what is going on in the bus, and overhear potential problems earlier than with loud engine interference. The absence of aggravating emissions could potentially reduce the risk of an emergency health event, like an asthma attack, occurring during a driver's route as well. Finally, drivers will benefit from a healthier bus environment, which may lead to improved job satisfaction and employee retention rates. Competition to apply for a driver position may increase as a result.

iii) Greenhouse Gas Reduction Benefits

Along with improving local air quality, New York City also has set an ambitious goal of reducing citywide greenhouse gas ("GHG") emissions by 80 percent by 2050 in order to combat global climate change.[26] Transportation is a large contributor to GHG emissions, making up 30 percent of citywide emissions as of 2015.[27] Vehicle emissions will have to be reduced as part of the City's plan to meet its climate goals and switching large bus fleets to electric can advance this goal. A study conducted in advance of the MTA pilot found that converting the entire 5,700 bus fleet would reduce GHG emissions by nearly 500,000 metric tons of CO2 per year.[28] Using

[24] Aber, *supra* note 12, at 5.
[25] Nicole Schlosser, *Can Electric School Buses Go the Distance?*, SCHOOL BUS FLEET (May 23, 2016), http://www.schoolbusfleet.com/article/713421/can-electric-school-buses-go-the-distance.
[26] N.Y.C. MAYOR'S OFFICE OF SUSTAINABILITY, NEW YORK CITY'S ROADMAP TO 80X50, 5 (Sept. 2016), https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City's%20Roadmap%20to%2080%20x%2050_Final.pdf.
[27] *Id.*, INVENTORY OF NEW YORK CITY GREENHOUSE GAS EMISSIONS IN 2015, 7 (Apr. 2017), https://www.dec.ny.gov/docs/administration_pdf/nycghg.pdf.
[28] Aber, *supra* note 12, at 12.

EPA's 2015 social cost of carbon, the same study estimated that substituting each existing MTA bus with an electric replacement would save just over $36,000 in carbon-related costs over the course of the bus's useful life.[29] Converting the fleet by 2025 would contribute about .5 percent of the entire United States' Paris Agreement objectives.[30] New York is particularly well-suited to transition to electric vehicles because its electricity production uses very little coal, unlike in many other states where the downstream reduction in emissions from driving electric vehicles is counteracted by upstream coal emissions.[31]

iv) Costs, Offsets, and Vehicle-to-Grid Technology

Currently, electric school buses cost around $325,000-350,000 for a seventy person bus,[32] which is three times as much as similar sized diesel buses cost to purchase.[33] Additionally, electric buses require charging infrastructure at the bus lots, which may in turn require costly utility upgrades to handle the electricity increases.[34] Moreover, while battery technology is improving to allow for longer distance travel, it is still limited to a 65-155 mile range,[35] which could be exceeded throughout a full day of routes. There is also the risk of a charging

[29] *Id*. at 19.
[30] *Id*. at 13. These numbers would need to be adjusted for a larger school bus fleet that is primarily in operation nine months of the year with a different route schedule and varying bus sizes, so while it is unclear if the gains would be greater or not, the potential is significant. Notably, while electric vehicles have no tailpipe GHG emissions, they impact emissions over their lifecycle from construction, electricity and battery production, and disposal. Alexandra B. Klass, *Public Utilities and Transportation Electrification*, IOWA L. REV., 8 (forthcoming 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3150402.
[31] Klass, *supra* note 30, at 8.
[32] For example, Blue Bird's model costs $335,000, and eLion options range from $325,000 to $333,0000. NYSEV-VIF "All-Electric" Vehicle Eligibility List, NEW YORK STATE TRUCK VOUCHER INCENTIVE PROGRAM (last accessed Nov. 24, 2018), https://truck-vip.ny.gov/NYSEV-VIF-vehicle-list.php. Other sources report eLion buses costing $350,000. Sebastian Blanco, *Lion Electric Bus Now Ready For York City's Pre-Order*, FORBES (May 30, 2018), https://www.forbes.com/sites/sebastianblanco/2018/05/30/lion-electric-bus/#59ad09162827.
[33] Interview with Corey Muirhead, *supra* note 11.
[34] Logan Bus Company considered entering the CNG market several years ago, but the cost of converting their lot to accommodate CNG fuel was around $1 million. Alternatively, purchasing just a few CNG buses and fueling them would have required going to the only CNG fuel lot at the time by JFK airport. That was an impractical and inefficient distance for buses to travel out of their way, mid-route. For a transition to electric buses, there needs to be a coordinated cost and infrastructure plan. *Id*.
[35]The Lion Electric Co., Electric School Bus, https://thelionelectric.com/en/products/electric.

malfunction occurring overnight, which would require taking the bus out of service the next morning. However, electric buses provide a number of long-term cost saving opportunities and the technology itself is expected to decrease in price as batteries become cheaper and demand for the buses increases. As battery prices decline, electric buses should get closer to reaching cost parity with diesel buses.[36] Utility companies can play a role in coordinating infrastructure and potentially subsidizing the costs.

Even with upfront costs where they are presently, electric buses offer lower lifetime maintenance and labor costs than comparable diesel engines, and they eliminate fuel costs in exchange for lower electricity costs. Electric buses do not require the oil, filter, and brake maintenance of diesel buses, and evidence suggests a 40-50 percent reduction in annual maintenance costs.[37] Electric drive reduces required brake maintenance, replacement, and lubricant.[38] It is not subject to the volatility of changes in fuel prices, which have been on the rise again in recent years. Charging can be done at off-peak hours, when the electric vehicle charging rate is significantly cheaper, to ensure utility bills remain below fuel costs of diesel engines.[39]

The MTA study found significant lifetime savings of $168,000 per bus from reduced maintenance and fuel costs.[40] Early results from a small pilot program in Amherst, Massachusetts noted a series of mechanical problems in a pilot evaluation, some of which

[36] A recent report estimates that electric buses will reach unsubsidized cost parity with diesel buses by 2030, in part because battery prices will decrease from 26 to 8 percent of the overall bus cost by then. However, this study uses European data that reports higher prices for both diesel and electric buses than school bus prices in the U.S., and has a narrower price gap between the two. It is not clear whether even a significant decline in battery prices would close the price gap in the U.S. school bus market. BLOOMBERG NEW ENERGY FINANCE, ELECTRIC BUSES IN CITIES, 29-30 (Mar. 29, 2018), http://electricschoolbuscampaign.org/wp-content/uploads/2018/07/Bloomberg-New-Energy-Finance-Electric-Buses-in-Cities-Final-Report-March-29-2018.pdf.
[37] Aber, *supra* note 12, at 16.
[38] Schlosser, *supra* note 25.
[39] CON EDISON, Time-of-Use Rates (last accessed Nov. 24, 2018), https://www.coned.com/en/save-money/energy-saving-programs/time-of-use.
[40] Aber, *supra* note 12, at 32.

required the bus to be taken out of service and included software system and electrical accessory issues.[41] However, maintenance was covered under warranty and the problems occurred less frequently over time, in particular after Lion Bus company was able to access the bus computer systems remotely.[42] Taking a bus out of service poses a significant reliability problem, so feedback from pilot programs is important for manufacturers in order to fix issues prior to widespread adoption.

In addition to direct fuel and maintenance savings, the immense batteries provide an opportunity to use emerging vehicle to grid technology ("V2G") to strengthen the electric utility grid during peak-demand times while providing cost subsidies to owners. Utility companies play a key role in implementing V2G programs and V2G's potential is incentivizing them to install the necessary charging infrastructure in bus lots for free or reduced cost. V2G allows buses to send power back to utility companies, serving as assets that strengthen the electric grid when they are not in use during high demand times – think hot summer days. Electric buses are able to discharge power from the battery to the power grid, which the electricity company can control and implement during periods of high demand.[43] Electric school buses are particularly well suited for V2G programs because the school calendar aligns with peak demand in summer, and an estimated 70 percent of the City's buses sit unused during those months.[44] Buses can also be moved around to areas of particularly high demand.

V2G programs could be used to offset upfront costs or the bus companies' utility bills, depending on how a program is structured.[45] In a school bus pilot in White Plains, Con Edison

[41] VT. ENERGY INV. CORP., ELECTRIC SCHOOL BUS PILOT PROJECT EVALUATION, 29 (Apr. 20, 2018), https://www.veic.org/documents/default-source/resources/reports/veic-ma-doer-electric-school-bus-pilot-project.pdf?sfvrsn=2.
[42] *Id.*
[43] Telephone Interview with John Shipman, Dep't Manager, Electric Vehicles Program, Con Edison (Oct. 15, 2018).
[44] CON EDISON, *supra* note 6, at 4.
[45] Interview with John Shipman, *supra* note 43.

paid 25 percent of the upfront bus cost, 25 percent of the cost of chargers, and all V2G costs.[46] This pilot is also making sure that the use of these batteries as grid assets does not impact the battery life during normal operational use.[47] In a broader plan, and with permission from state energy officials or legislation, V2G programs could create a market in which bus companies sell power back to utility companies. However, the latter option would not immediately defray upfront costs, which may be more critical to reduce in this case. As it is doing in White Plains, in New York City, Con Edison would play a key role in installing charging infrastructure and may want to expand its V2G program and use these buses as grid assets in exchange for paying part of the upfront costs, defraying the burden on bus companies. Contractors will need charging infrastructure installed on their lots and high-speed charging stations, if needed to accommodate route lengths, could be installed at schools or convenient hubs. Small-scale pilot programs have thus far attracted financial support from utility companies, but a more comprehensive plan may be necessary to incentivize utility companies to pay for citywide upgrades.[48]

IV. NEW YORK CITY PILOT PROGRAM

Before requiring a widespread transition towards electric school buses, New York City should exercise its existing authority to conduct a pilot. Such a pilot would allow the City to test the new buses in city conditions, identify and remedy issues that may arise, and explore a fleet transition policy.

[46] CON EDISON, *supra* note 6, at 4.
[47] Interview with John Shipman, *supra* note 43.
[48] In addition to Con Edison contributing to the White Plains costs, the local electric company in Twin Rivers, CA paid for any infrastructure costs not covered by grant money. Telephone Interview with Tim Shannon, Dir. of Transp., Twin Rivers Unified School District (Apr. 11, 2018). (See Appendix A (A)).

i) The Case For A Pilot Program in NYC

As New York City contemplates designing its own electric school bus pilot program, it can look to the examples set by several other school districts. Twin Rivers, California, Amherst, Massachusetts, and White Plains, New York have all implemented electric school bus pilot programs. An overview of each of these pilots is provided in Appendix A of this report.

So far, pilots have typically consisted of a school district or group of districts purchasing a small number of buses directly and contracting for labor. However, White Plains unveiled five electric school buses this summer that are operated by the district's existing bus contractor, National Express, which handles program logistics and coordinates with the utility company and agencies, such as the New York State Energy Research and Development Authority.[49] Having an experienced bus company involved from the beginning could increase industry support for further electrification and seamlessly incorporate the buses into the existing school transportation network, as opposed to layering on a city-owned bus program.

Similar to the pilot in Twin Rivers, the local utility provider in White Plains (Con Edison) is involved in the partnership and is providing charging infrastructure and financial assistance, but unlike in Twin Rivers, White Plains is experimenting with V2G capabilities. Both the White Plains and Twin Rivers pilot projects received grant and state funding to subsidize the cost of electric buses, and New York City may also be able to secure such funds for its potential pilot program. Funding sources could include the New York State Truck Voucher Incentive program and the Volkswagen settlement funds.

[49] CON EDISON MEDIA RELATIONS, *Electricity from School Bus Batteries Will Support Con Edison Grid Reliability*, CON EDISON (June 19, 2018), https://www.coned.com/en/about-con-edison/media/news/20180619/electricity-from-school-bus-batteries-will-support-con-edison-grid-reliability.

The existing pilot programs provide helpful preliminary feedback as to program costs, rider experience, vehicle reliability, and community support. Moreover, while the districts that have already implemented school bus programs are smaller than New York City, the MTA pilot program will provide critical feedback on what works for this City's unique environment, particularly for charging capacity given traffic congestion.[50]

There are a large number of questions that New York City should try to address with its potential pilot program. The following is a non-exhaustive list of such questions:

1. *From the bus owners' perspective, do the lifetime savings that electric school buses provide justify the high upfront costs?* Specifically, will bus companies be able to recoup savings during the life of the bus that exceed the increased cost of the bus compared to diesel buses? For lifetime savings to exceed the upfront costs, electric buses will need to provide reliable, and ideally better, service than diesel buses, maintenance costs will need to be reduced, and utility bills from charging will need to be lower than fuel costs. To assess whether these conditions are obtained, maintenance issues should be closely tracked, which the Amherst pilot has done, and particular attention should be paid to any costs incurred for out-of-warranty maintenance that would be incurred by bus contractors. Notably, battery lease options might be a useful alternative for the City in order to reduce high upfront costs by spreading the cost out over the life of the bus and more closely aligning costs with typical vehicle fuel costs and annual budgeting.[51]

[50] METRO. TRANSIT AUTH., *MTA Testing 10 New, All-Electric Buses to Reduce Emissions & Modernize Public Transit Fleet* (Jan. 8, 2018), http://www.mta.info/news/2018/01/08/mta-testing-10-new-all-electric-buses-reduce-emissions-modernize-public-transit [hereinafter *MTA Pilot*].
[51] Aber, *supra* note 12, at 29.

2. *What aspects of any broader plan can Con Edison assist with, such as upgrading lot utility infrastructure, installing charging stations, and vehicle-to-grid technology?* A pilot presents an opportunity to work directly with utilities to explore V2G technology. Con Edison is monitoring whether the use of V2G technology affects the battery life of the buses in White Plains, and should replicate this in any city electric school bus pilot.[52] If current battery technology is inadequate to meet the needs of the City's bus routes, additional charging infrastructure may be necessary at schools or other central hubs. The City could also explore sharing charging infrastructure with its own public fleets or the MTA, depending on location and charging demand schedules.
3. *How do batteries perform in the New York City climate?* Ambient air temperature influences battery efficiency and the fuel economy of electric vehicles more than it does for diesel powered vehicles, so route testing needs to be done in various weather conditions.[53] Moreover, cabin temperatures must be maintained during winter and early summer months, yet heating and cooling systems are a significant drain on batteries, reducing route length capabilities. The City should determine whether a separate battery source is needed, and if so, identify electric or other zero-emissions heating and cooling sources to ensure that eliminated emissions are not reintroduced back into the bus. A diesel heater, for example, would cancel out improvements in student health even if overall air emissions are still reduced.[54] If the buses do not appear to need a second battery source, pre-heating or pre-cooling the

[52] Interview with John Shipman, *supra* note 43.
[53] Aber, *supra* note 12, at 23.
[54] VT. ENERGY INV. CORP., *supra* note 41, at 37-38.

buses while they remain connected to the charging station can prevent unnecessary battery drain, although once students board the bus, pre-cooling in particular will be less effective.[55]

4. *What are the estimated public health benefits and air quality benefits that switching to electric school buses would provide?* If the public health and air quality benefits are substantial, then governments might be justified in subsidizing the transition to electric vehicles in the event that the private costs to bus companies of transitioning exceeds the private benefits to bus companies.
5. *Finally, what are the GHG emissions associated with electric school bus usage in New York City?* To estimate this, the City will need to track the amount of electricity used by the buses and the carbon intensity of the electricity supplied.

ii) <u>New York City's Legal Authority for a Pilot</u>

New York City has the legal authority to begin a pilot project now. The City's Department of Education is authorized by State and City procurement regulations to request proposals for demonstration projects for "innovative products, approaches, or technologies."[56] Demonstration projects can be proposed for goods, services, or construction by the DOE's own initiative or an unsolicited proposal.[57] The Executive Director of the Department of Education must make a determination that explains why a standard competitive solicitation is not feasible in this instance or that there are particular benefits to the demonstration method of source selection.

[55] The Twin Rivers' pilot found that pre-heating buses and setting a temperature timer for their electric heaters was successful for their winters, albeit in more temperate weather than New York. Interview with Tim Shannon, *supra* note 48.
[56] N.Y.C. DEP'T OF EDUC., Procurement Policy and Procedures § 3-12, http://schools.nyc.gov/Offices/dcp/DepartmentofEducationProcurementPolicyandProcedures.pdf.
[57] *Id.* An example of an unsolicited proposal is a private school bus contractor approaching the City and volunteering their plan to conduct a pilot program, without any formal City solicitation for such a program.

Depending on the cost of the project, the Executive Director or the Chancellor ultimately approves the project.[58]

While the City already has the legal authority to begin a pilot program, there is a State law that limits the width of school buses in New York City to 98 inches.[59] Presently, no available electric school bus models are 98 inches or less, due to the battery size. It is unclear whether the maximum width law is necessary for current street sizes, given that the MTA buses operating in the City can be up to 102 inches,[60] but it is possible that certain residential streets are too narrow for wider buses. Wider buses for public transit were introduced to accommodate additional safety features, larger people, and because the main roads had been widened.[61] The City might be able to obtain a waiver from the State to enable existing models of electric buses to be used in a pilot.[62] Alternatively, the City might request that the State modify the law to facilitate a pilot. In the future, electric bus manufacturers may manufacture models under 98 inches wide so that the legal restriction may not be a long-term obstacle to electrifying school buses. Several bus companies, including Blue Bird, are aware of the width restriction and there are plans to release narrower models in the near future.[63]

iii) Funding for a Pilot

The costs of a pilot program would vary depending on factors such as the scale of the pilot, the number of electric buses involved, the requirements for charging infrastructure, and the

[58] *Id.*
[59] New York City school buses cannot exceed 98 inches in width. N.Y. VEH. & TRAF. § 385(1)(e).
[60] *Id.* § 385(1)(f).
[61] S. 7511, N.Y.S. LEGIS. ANN., *Transportation, Bus width regulations*, 389-90 (1970) (describing the proposed N.Y. VEH. & TRAF. § 385 and reasons for an increase in permissible vehicle width).
[62] N.Y. VEH. & TRAF. § 385(15)(a).
[63] Brooklyn was an initial site proposal for what is now the White Plains pilot, but the State did not want to grant a waiver with several 98 inch models entering the market within the next year or two. Interview with John Shipman, *supra* note 43.

routes that they would travel. Working with stakeholders, the City would need to estimate the costs, and mechanisms that could be used to defray them.

There are different potential sources of funding for the upfront costs of buying the buses, and installing necessary charging infrastructure. The New York State Truck Voucher Incentive Program for commercial truck and bus fleets was utilized this summer in the White Plains pilot and covered $110,000 of the upfront costs for eLion buses, roughly one-third of the cost, but has since lapsed and has not yet been renewed by the state legislature.[64] New York City has its own voucher incentive program that is also currently out of funds. However, using this fund would divert to school buses funds intended to incentivize purely private actors to transition to clean engines and so might not be desirable in any event.[65] The City might seek a portion of the $127.7 million in Volkswagen settlement funds awarded to New York, which Governor Cuomo has designated for clean transportation, including school buses.[66] Moreover, New York City can pursue a partnership with Con Edison, as is being done in White Plains, to upgrade utility infrastructure at school bus operator lots and install charging infrastructure at reduced or no cost. Bus companies or the City also might seek funding from private foundations.

In White Plains, the City is not spending any additional money on this pilot beyond its existing school bus contract with National Express.[67] For upfront capital expenses, Con Edison is paying 25 percent of vehicle and charger costs, and 100 percent of V2G hardware and project management costs in return for exclusive use of the vehicles as grid assets roughly 25 percent of

[64] NYSEV-VIF Vehicle Eligibility List, *supra* note 32. As of June 2018, $0 remain in the state and city voucher funds. N.Y.S. TRUCK VOUCHER INCENTIVE PROGRAM, https://truck-vip.ny.gov/index.php.
[65] NYCAFV-VIF "Alternative Fuel" Vehicle Eligibility List, N.Y.C. ALT. FUEL VEHICLE – VOUCHER INCENTIVE FUND (last accessed Nov. 24, 2018), https://truck-vip.ny.gov/NYCAFV-VIF-vehicle-list.php.
[66] N.Y. GOVERNOR'S PRESS OFFICE, *Governor Cuomo Announces New York to Invest $127.7 Million Volkswagen Settlement in Clean Vehicles* (Sept. 5, 2018), https://www.governor.ny.gov/news/governor-cuomo-announces-new-york-invest-1277-million-volkswagen-settlement-clean-vehicles.
[67] Telephone Interview with Joseph Ricca, Superintendent, White Plains School District (Oct. 22, 2018).

the year.[68] The New York State Truck Voucher Incentive Program covered 39 percent of upfront vehicle costs, with National Express paying the remaining 35 percent of vehicle costs not paid by Con Edison and the Program, which seems comparable to the cost of a traditional diesel bus.[69] National Express is paying 75 percent of charger costs, 100 percent of school year energy costs, and 100 percent of maintenance and operating costs.[70] New York City can look to this model to structure cost allocation in a way that may not cost the City beyond its existing bus contracts.

V. STEP 2: ELECTRIFYING AFTER A PILOT

Assuming that the pilot program indicates that electric vehicles are cost-beneficial from a societal perspective, and the City decides to transition from diesel to electric school buses, the City should have ample legal authority to mandate the change. Specifically, the City likely has the legal authority under State law to require that school bus operators utilize electric buses and, if properly structured, such a requirement is unlikely to be preempted by federal law. This part describes how the City might legally require the electrification of school buses under governing state law. Then it explains why a City initiative is unlikely to be found to be preempted by the federal Clean Air Act or Energy Policy and Conservation Act.

i) City Authority Under State Law

Transportation contracts for New York City's school district are governed by state education law, which, absent a few exceptions, requires a competitive bidding process and that the City contract with the lowest responsible bidder.[71] The process is carried out by the New

[68] CON EDISON, *supra* note 6, at 7-8.
[69] *Id*.
[70] *Id*.
[71] N.Y. EDUC. § 305(14)(a).

York City Office of Pupil Transportation ("OPT"), under the City's Department of Education and the Education Chancellor.

As mentioned above, the OPT relies mainly on extensions and renewals, so in practice, the City rarely issues new requests for bids and 60 percent of routes have not been re-bid since 1979.[72] While OPT renewal contracts can speak to the age of vehicles, a variety of vehicle specifications, and maintenance schedules, it is not clear that OPT could implement a transition to electric buses through extensions or renewals or that such a policy would be practical. The following analysis assumes that the City is willing to issue new bids for school transportation contracts. If the City is unwilling to do so, either City Council legislation will be necessary to electrify the school bus fleet or bus companies must come to regard electric vehicles as cost-beneficial from their perspective and purchase them on their own initiative.

There are several ways that the City could use the bidding process to electrify the school bus fleet. Of these options, the City would likely be on the most solid legal footing if the City Council were to legislate that school bus contractors must phase in electric buses over a period of time as their existing fleets age. Such a mandate would then also be incorporated into OPT's future requests for bids so that contractors would begin submitting bids using electric buses.

a) *City & OPT Authority to Set Terms for Bids*

When the City initiates a competitive bidding process, it has some leeway under State and City law to set the terms of the bid. OPT, for example, can specify it wants only buses of certain models, with particular seating capacities. However, OPT's ability to specify terms is restricted by a prohibition on restrictive bidding clauses that is common throughout City and

[72] Champeny, *supra* note 7.

State procurement regulations.[73] This means, for example, that OPT cannot require bidding bus companies to use a particular brand of motor, but it does allow for a variety of other bid specifications. Specifying a particular brand of manufacturing part, or indirectly describing it in a manner that limits the choice to that particular brand, would tend to increase bid prices and "permit unfair advantage or favoritism."[74] So, while OPT could not require the use of Lion's eLion electric school bus, OPT could require the use of electric engines and heaters, or a broader alternative fuels description. While the market for electric buses is presently still small, it is rapidly expanding, with multiple manufacturers having already introduced models of electric school buses.[75]

The multiplicity of models is relevant if the City determines it is necessary to install charging infrastructure outside of contractors' lots. The buses that contractors buy must be compatible with any communal charging stations, yet the City cannot require contractors to buy particular models of electric buses under the restrictive bidding clause prohibition. It appears that the electric vehicle battery plugs and chargers are universally compatible aside from Tesla (which does not manufacture school buses), but this is a point to keep in mind as brand variety for electric buses and chargers increases and changes.

---

[73] 8 NYCRR § 156.1(d) "Bid specifications shall not include special requirements relating to buses, drivers, maintenance and service facilities, the exclusive use of buses, or any other matter which tends to restrict competitive bidding." However, the commissioner can authorize essential special requirements if necessary. *See also*, N.Y.C. CHARTER ch. 13, § 321.

[74] Randolph McNutt Co. v. Eckert, 177 N.E. 386, 387 (N.Y. 1931); Smith v. Syracuse Imp. Co., 55 N.E. 1077, 1078-79 (N.Y. 1990) (voiding a pavement bid specification requiring the use of one company's paving materials for unduly restricting competition, as it would allow the monopolist to determine their own price).

[75] Reportedly, the three largest suppliers of school buses in the U.S. now offer electric school bus models (Thomas Built Buses (Daimler-owned), Blue Bird and IC Bus), although some of the companies do not yet have their models on the road. Tevin C.S. Grant, *E.V. School Buses. Take Two*, ELECTRIC SCHOOL BUS CAMPAIGN (July 5, 2018), http://electricschoolbuscampaign.org/ev-school-buses-take-two/. As of 2017, Blue Bird and Lion already have electric buses in use. Brett Williams, *The Wheels on Daimler's New Bus Go Round and Round, Thanks to Electricity*, MASHABLE (Nov 10, 2017), https://mashable.com/2017/11/10/daimler-electric-school-bus-jouley/#JzQ8HSyJemqq.

For common specifications to withstand a restrictive bidding challenge, the district need only to survive rational basis review. A facially restrictive, comprehensive, and atypical specification such as an "Employee Protection Provision," is subject to heightened scrutiny that includes a less restrictive alternatives assessment.[76] As an engine specification seems more analogous to requiring a "particular shade of paint" or a pricing scheme than a comprehensive labor hiring preference, an electric engine requirement would likely be a common specification.[77] However, given the 98 inch width requirement, only one or two brands might manufacture compliant buses. Moreover, an electric engine requirement, if implemented in the near future, could be the first in country and thus highly unique, like an "Employee Protection Provision," so an argument could be made to assess the requirement under heightened scrutiny.[78] Nevertheless, it is likely that more manufacturers will be participating in the market by the time an electric-only requirement would be implemented, or it is possible that the 98 inch law could be changed or waived. Other factors weighing in favor of subjecting the City to rational basis review would be the facially neutral nature of the electric requirement and that bidders would retain all negotiating power with the electric bus or engine dealerships.[79] As discussed in Part III of this paper, rational justifications for an electric specification include reduced fuel and maintenance costs, health and safety benefits, air quality improvements, and greater service reliability from reduced maintenance needs. Finally, given recent attention to the development of electric school buses, such a requirement could actually increase competition, advancing the City's procurement

[76] L&M Bus Corp. v. N.Y.C. Dep't of Educ., 17 N.Y.3d 149, 157-58 (N.Y. 2011) (finding Employee Protection Plans, which required a hiring preference and salary and benefits matching for those unemployed because of their former employer's loss of a DOE bus contract, anticompetitive under heightened scrutiny but upholding the bus service pricing scheme under rational basis review.)
[77] *Id*.
[78] *Id*.
[79] *Id*. (finding that EPPs "proscribe the use of the contractor's work force altogether," and make salary and benefits nonnegotiable).

goals by encouraging new bidders to compete against longtime contract holders with existing fleets and propose new cost-effective ways to provide school bus service to the district. In fact, efforts to form a school bus workers cooperative are ongoing in hopes of receiving a portion of future contracts.[80]

In sum, an electric engine requirement could trigger a restrictive bidding challenge, but given the growing market for such engines and that the policy would not restrict contractors' ability to negotiate terms and prices with electric bus companies, it is likely to survive judicial review. This leaves the City Council or the Department of Education with the ability to decide that as a proprietor it wants to contract only for electric vehicles, much like other City agencies have decided to purchase only alternative fuel vehicles going forward.

b) *City & OPT Authority to Rank Bids*

Once OPT receives bids from school bus contractors, it ranks and assesses them. "Lowest responsible bidder" assessments require consideration of the total cost of the proposal, the contractor's prior relevant experience, employment history, safety programs, accident records, employee driving history, vehicle inspection records and model year, maintenance schedules, a financial analysis of the contractor, and insurance compliance documentation.[81] Categories are weighted and specified *ex ante*, and no single category can exceed 50 percent of the total weighting.[82] If OPT specifies up front that buses must be electric, then the lowest responsible bidder requirement is not a legal obstacle because OPT would only consider bids offering electric buses, which should have comparable total costs. However, if OPT specified it would

[80] Rafael Espinal, *How Yellow School Buses Could Green New York City*, CITY & STATE NEW YORK (Jan. 11, 2018), https://www.cityandstateny.com/articles/opinion/the-yellow-school-bus-could-green-new-york-city-rafael-espinal.html.
[81] 8 NYCRR § 156.12(b).
[82] *Id*. § 156.12(c).

give preference to bids with electric buses but also accepts bids with diesel buses, it needs to ensure compliance with the lowest responsible bidder assessment given the significantly higher upfront costs of electric buses and uncertainty surrounding OPT authority to rank bid preferences by engine type.

State education and procurement laws suggest that within the state law confines of requiring awards to the lowest responsible bidder, agencies have wide discretion in how they assess bidders because they are typically not subject to judicial review. If a bidder challenges the lowest responsible bidder determination, contracting agencies have significant discretion to assess the skill and integrity of particular bidders and the lowest price bid is not necessarily the lowest responsible bidder as a matter of law.[83] As a general matter, absent a showing of "illegality, fraud, collusion, corruption, or bad faith," lowest responsible bidder determinations are not subject to judicial review.[84] While this lack of judicial review provides the City with autonomy to exercise its purchasing preferences, it also leaves uncertainty with respect to what additional considerations, if any, the City can take into account in addition to the required categories and what qualifies as a "cost" in the City's assessment.

In practice, school bus contracts are awarded by route to numerous bidders, so the lowest responsible bidders are determined by selecting the combination that ensures the lowest system-wide, total cost, or the lowest feasible bid.[85] As bidders tend to bid on multiple routes, even if they lack capacity to fulfill all of those routes should they be selected to service all of their selections, an algorithm has been used to determine to optimal allocation of bidders' supply.[86]

---

[83] Picone v. New York, 29 N.Y.2d 539, 541 (N.Y. Sup. Ct. 1941).
[84] *Id*. at 542.
[85] *See, e.g.*, N.Y.C. DEP'T OF EDUC., STANDARD FORM OF CONTRACT, Serial No. B3182 § 1.26 "Award".
[86] Interview with Oliver Buhler & Esteban Tabak, Professors of Mathematics, N.Y.U., in N.Y.C. (Apr. 23, 2018). Professors Buhler & Tabak created and administered the algorithm for OPT under the Bloomberg administration and afterwards. However, their services have not been requested recently, likely to do a lack of competitive bidding requests.

OPT conducts inspections of the bidders to determine their actual capacity and that they meet any required specifications, provides parameter data such as student needs per route, and the algorithm determines the bid results.[87] Currently, OPT conducts the feasibility assessments and provides the data to run the algorithm, so compliance with any requirement for electric vehicles would be confirmed *ex ante* by OPT. Alternatively, a scoring or ranking model could be easily incorporated into such an algorithm to allocate efficient portions of the overall contract to electric or alternative fuel vehicles, calculate cost over many years, or account for public health or environmental expenditure savings.[88]

c) *City Council Authority to Legislate Vehicle Requirements*

The City's inherent procurement power allows the City Council to determine appropriate transportation purchases for the City and to direct the Department of Education to incorporate such requirements into its contract process, subject to limits like the prohibition on restrictive bidding and the lowest responsible bidder requirement, and state education laws.[89] Significantly, while legislative requirements are incorporated into requests for contract bids, such requirements are also mandatory all on their own. Absent an available waiver or exemption process, a bus contractor must comply with legislated engine upgrades according to schedule, regardless of whether its contract was renewed, extended, or selected as a new bid. This is particularly helpful in an industry where renewals and extensions are commonplace.

As discussed earlier, the City Council has already expressed interest in legislating to promote the electrification of school buses. The phase-in requirements for schools buses in Intro.

[87] *Id.*
[88] *Id.*
[89] For example, the City's school system is structured according to state education law, which grants authority amongst the mayor, City council, chancellor, and board of education, and sets a variety of regulations regarding, among other things, hiring, budgeting, facilities, and oversight mechanisms. N.Y. EDUC. § 2509 et seq.

455 would require contractors to begin transitioning to CNG, hybrid, electric or diesel that meet the latest EPA emission standards in 2020 and require exclusively electric engines by 2040, the same year the MTA has set for its bus electrification goal.[90] The phase-in requirement also comports with existing model specifications in that it is specific to school bus contracts, and uses model years as benchmarks, much like existing diesel and ventilation requirements. However, the lack of a comprehensive plan in the bill to address the upfront costs of electric school buses and the establishment of charging infrastructure would likely steer purchasers towards CNG or hybrid models in the near-term, which would delay electrification.

Overall, Intro. 455 is an important bill that deserves debate and stakeholder input, especially at a time where a new state funding source might be available to the City to support electrifying school buses. It may be wise to hold off passing such a bill until initial pilot program results are in, at which point perhaps bus contractors may be more confident in the feasibility of electric buses, too.

d) *OPT Authority to Implement Unilateral Requirements*

In the absence of City Council legislation mandating the electrification of school buses, the OPT might insert a requirement into bids that contractors use electric buses. Alternatively, the OPT might indicate in requests for bids that it will give a preference, or more highly weight, bids from companies proposing to use electric school buses. It is not clear that OPT has the legal authority under State law to provide a preference or more highly rank bids proposing to use electric buses. To support such a preference, OPT might argue that it is required to consider the "total cost" of a bid, which includes quantifiable social costs of healthcare and air pollution

[90] INT. 455, *supra* note 12.

borne by the City that would not be included in the bid price from a contractor.[91] Electric bus bids will provide the City with social cost savings, and thus should be given priority over more costly vehicle options. To provide OPT with express authority to prefer or more highly weight bids from electric bus operators, the City could request that the State legislate to give OPT and other government agencies authority to consider in evaluating bids the environmental consequences of the products being procured.

California law provides a model for a possible revision to New York State law to expand the factors that governments can consider in competitive procurement.[92] California pilot projects, including Twin Rivers, benefit from a competitive procurement option that allows agencies and districts to use a point scoring system in certain cases for complex, unique, or innovative needs.[93] Cost remains a primary category, but governments are able to take into account sustainability benefits and award points for benefits including clean air impacts and use of alternative fuels. Requests can clearly state at the outset how points will be awarded and methods will be ranked, so companies are not caught off guard with an opaque grading system. This allows governments to measure value in ways that captures concurrent policy goals – in the case of school buses, providing quality transportation to students while also meeting environmental and health goals. In the case of Twin Rivers, the school district was able to bid out with an alternative fuel requirement that included compressed natural gas, propane, or electric engines but stated upfront it would award the most points for electric engines.[94] Twin Rivers' request for bids did not take

[91] I am not aware of precedents for adjusting bid costs upwards to reflect the social costs of pollution from the products that the government is procuring.
[92] CAL. DEP'T OF GEN. SERVS., CALIFORNIA CONTRACTING MANUAL, Vol. 1, Ch. 5, § 5.25, http://www.dgs.ca.gov/Portals/32/Users/141/25/3725/chapt%205.%20%20rev%20Jan%202018.pdf.
[93] *Id*.
[94] Interview with Tim Shannon, *supra* note 48.

into account reductions in public health costs, but if New York City were able to successfully advocate for changes to the State procurement law, it should advocate for this authority as well.

The City should pursue procurement rules clarifications from the State regarding uncertainty about what can be taken into account as a cost and whether scored or weighted bidding for alternative fuel engines is a permissible category to consider for the lowest responsible bidder. This point applies beyond school buses to numerous areas where the City wants to improve public health, reduce air pollution, or combat climate change, policy goals that are in fact very costly, yet not *directly* included in the cost of a contract. This does not stray from the City acting as a proprietor – as a purchaser, the City has a right to consider whether its purchase in one area will affect its budget elsewhere, potentially producing savings. This should be an important component of large-scale contracts, particularly those directly impacting air and water quality and the health of the City's residents.

e) *City Council Legislation is Superior to OPT Unilateral Action*

A legislative solution is superior to OPT tackling this problem itself through its contract awarding process. There are several reasons why a legislative solution is preferable. First, City Council legislation should provide enhanced transparency and warning; contractors should have fair notice of the change in policy in order to have ample opportunity to establish a financial plan. Second, a mandate will apply to bus contractors across the board, which will circumvent the issue that contracts are infrequently bid out. Third, the routes bid out for a given year might not align with an efficient installation of charging infrastructure at particular companies' lots that also aligns with any agreements the companies make with Con Edison. Finally, a coordinated legislative plan can more closely align with any parallel funding programs, such as grants or

subsidies. Companies can apply well in advance based on the age of their fleet, instead of waiting until bidding for or being awarded a contract.

ii) The City Would Not Be Preempted by Federal Law

The City has the authority to electrify school buses without being preempted by the federal Clean Air Act ("CAA") or Energy Policy and Conservation Act ("EPCA"). Both the CAA and EPCA have fairly expansive preemption provisions, which set a floor and ceiling for standards regulating vehicle emissions and fuel efficiency, respectively.[95] However, the statutes also contain certain exceptions to their preemptive reach, and, as will be described in more detail below, these exceptions should allow a City mandate to electrify school buses to stand.

a) *Preemption Under the Clean Air Act*

The City's electric school bus requirement is not likely to be preempted by the CAA; although it would be considered an emissions standard potentially subject to preemption, the City is operating as a market participant in procuring contracted school bus services and, as a result, is authorized to exercise its preferences, including for electric vehicles, in purchasing those services.[96]

The CAA grants the Environmental Protection Agency authority to set federal emissions standards for new motor vehicles and vehicle engines. The statute's preemption clause prohibits

[95] 42 U.S.C. §§ 7521 et seq. and 49 U.S.C. §§ 32901 et seq.

[96] The market participant doctrine is a tool of constitutional interpretation that reflects state and local government autonomy and recognizes that governments can act as direct purchasers of goods and services without exercising impermissible regulatory authority. Where a state or local government is acting like a private purchaser in the market and fulfilling the goals of procurement (which are not limited to cost), as opposed to exercising regulatory authority, it retains the ability to apply its preferences as conditions and demands as if it were in fact a private party. The question is "whether the challenged program constituted direct state participation in the market." Reeves, Inc. v. Stake, 447 U.S. 429, 435 n.7 (1980). Courts began to apply this doctrine as an overlay to federal statutes in preemption analyses, particularly in labor cases, on the theory that preemption only applies to state or local regulation, not procurement. *See* Bldg. & Constr. Trades Council v. Ass'd Bldrs. & Contrs. (*Boston Harbor*), 507 U.S. 218, 227 (1993) (finding a bid specification for "pre-hire" agreements was not government regulation and thus not subject to preemption).

states and political subdivisions from adopting or enforcing "any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines" and from requiring "certification, inspection, or any other approval relating to the control of emissions from any new motor vehicle or new motor vehicle engine as condition precedent to the initial retail sale, titling, or registration…."[97] Outside of this limitation, however, the CAA contains an exception to preemption, called a savings clause, providing for the "Retention of State authority" with respect to air pollution standards, limits, and abatement.[98] Therefore, an electric bus plan must either not be a standard relating to the control of emissions or be a standard that nevertheless falls outside the scope of the preemption clause through the market participant doctrine.

Supreme Court precedent makes it clear that a City requirement for electric buses would indeed be a standard under the CAA, which has been defined as something which is, "established by authority, custom, or general consent… criterion; test," and has been construed broadly in the realm of automobile regulations to include purchase restrictions, not just sale restrictions on the manufacturers.[99] In a case known as *Engine Manufacturers Association v. South Coast Air Quality Management Board* (hereinafter *"South Coast I"*) a group of auto manufacturers challenged a set of California fleet rules that mandated that consumers purchase either alternative fuel vehicles or vehicles that met emissions standards set by the California Air Resources Board.[100] In defending the fleet rule, California argued that it did not constitute a standard within the meaning of the CAA because it did not require manufacturers to *produce* vehicles that meet a given standard; instead, it only required that private purchasers choose vehicles that meet

[97] 42 U.S.C. § 7543(a).
[98] Nothing in the chapter "shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution." 42 U.S.C. § 7416.
[99] Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Bd., 541 U.S. 246, 252-54 (2004) [hereinafter *South Coast I*]
[100] *Id*. at 249-51.

particular emissions levels or come equipped with certain emissions-control technology.[101] The Court sided with the manufacturers. "The manufacturer's right to sell federally approved vehicles is meaningless in the absence of a purchaser's right to buy them," Justice Scalia wrote.[102] As Justice Scalia went on to explain, if there is no market demand for cars with particular engines or emissions technology, a manufacturer is *de facto* coerced to adhere to the higher standards. Applying this reasoning to question of school bus electrification, a City mandate to purchase electric school buses would likely be considered a standard. Thus, to escape preemption under the Clean Air Act, the mandate would have to fit within the market participant exception.

There is a strong case to be made that the City's mandate would fit within this exception. Specifically, Justice Scalia's interpretation of "standard" was in light of fleet rules that imposed an alternative fuel vehicle mandate on purely private purchasers, in addition to public operators and did not address rules applying only to government-owned or government-contracted vehicles, specifically "public fleets with public contracts" and buses "operated by private entities under contract to government agencies,"[103] leaving open whether the market participant exception would apply and what standard of review would be used, such as the presumption against preemption.[104] The City's requirement would only apply to private operators pursuant to a public government contract and would not affect purely private purchasers.

---

[101] *Id*. at 253-54.
[102] *Id*. at 255.
[103]The *South Coast I* fleet rules included a procurement requirement that urban buses "operated by government agencies or operated by private entities under contract to government agencies," be alternative-fuel vehicles. Another rule required alternative-fuel "or otherwise less-polluting" street sweepers that applied not only to vehicles purchased or leased by the government or agency, "public fleets," but also any "private individual firm, association, franchise, contractor, user or owner who provides sweeping services to a governmental agency…private fleets with public contracts." Engine Mfrs. Ass'n v. S. Coast Air Quality Mgmt. Bd., 498 F.3d 1031, 1036 (9th Cir. 2007) [hereinafter *South Coast II*].
[104] *South Coast I,* at 259.

In fact, in *South Coast II*, the Ninth Circuit subsequently found that the fleet rules at issue in *South Coast I* were not preempted to the extent they "direct[ed] the procurement behavior of state and local government[s]" and applied the presumption against preemption where historic state interests, like air pollution, are concerned.[105] Fleet rules governing procurement, purchasing, leasing, and *contracting* for the use of vehicles by local (and state) governments are state proprietary action, as opposed to regulatory action, that "essentially reflect the entity's own interest in its efficient procurement of needed goods and services."[106] Moreover, efficient procurement is not limited to cost, so seeking to limit air pollution is not problematic.[107] The government is entitled to pursue policy goals for itself as a purchaser. The Court found no Congressional intent to limit the market participant doctrine in this setting, as it both expressly reserves to states their traditional police powers and largely preserves that state role in addressing air pollution.[108] Finally, the Court was unaware of any case in which the market participant doctrine was precluded because a government's market power was too great.[109] This analysis weighs strongly in New York City's favor and suggests that an electric-only bus requirement for public contracts would fall within the market participation exception under the CAA, as the policy would not affect purely private parties.

If the City would prefer a policy that falls outside the scope of the CAA altogether, the text of the Act might provide two alternatives. The CAA only applies to "new motor vehicles or new motor vehicle engines," as related to the initial sale.[110] So, if the City were to mandate retrofitting existing diesel buses with gently used electric engines, or if the buses were leased

[105] *South Coast II* at 1039. The Ninth Circuit affirmed the District Court's market participant analysis of the CAA, which appeared to be the first of any court. *Id*. at 1042.
[106] *Id*. at 1045 (internal citations omitted).
[107] *Id*. at 1046-48.
[108] *Id*. at 1042, 1045.
[109] *Id*. at 1048.
[110] 42 U.S.C. § 7543(a).

after an initial sale, that may fall outside the scope of the act. However, depending on costs, availability, and feasibility, neither of these options may be practical routes to take and I mention them only to highlight the scope of the CAA.

b) *Preemption Under the Energy Policy & Conservation Act*

The Energy Policy and Conservation Act addresses issues of energy supply and demand, and relevant to this paper, grants the National Highway Traffic Safety Administration the authority to set standards for automotive fuel economy. Its express preemption clause bars states and political subdivisions of states from adopting or enforcing "a law or regulation related to fuel economy standards for automobiles covered by an average fuel economy standard under" the Act.[111] However, its savings clause allows any state or political subdivision of a state to "prescribe requirements for fuel economy for automobiles obtained for its *own use*" (emphasis added).[112] Therefore, a successful electric bus plan needs to either not "relate to" fuel economy standards or be exempted from preemption by being tailored to comply with the "own use" exception or falling under the market participant exception, if the two exceptions differ in scope.

EPCA's preemption and market participant analysis was addressed by a federal district court in 2008 when a taxicab association challenged New York City's attempts to improve the taxi fleets' fuel efficiency. The Court in that case, *Metro. Taxicab I,* used the analysis in *South Coast I and II* to define "standard" and "relate to" in EPCA as they were defined in the context of the CAA; private purchaser-side regulations are preempted along with manufacturer laws, the Court found, and a standard need not actually interfere with the relevant federal law in order to be "related to" its preemption subject matter.[113]

---

[111] 49 U.S.C. § 32919(a).
[112] 49 U.S.C. § 32919(c).
[113] Metro. Taxicab Bd. Of Trade v. City of New York, 2008 U.S. Dist. LEXIS 94021, at *28, 30-31 (S.D.N.Y. Oct. 31, 2008) [hereinafter *Metro. Taxicab I*].

New York City subsequently revised its rule to remove the explicit mileage requirements and instead grant incentives for hybrid engines.[114] Yet the courts were still unsatisfied; in *Metro. Taxicab II*, a judge in the Southern District of New York held that the incentives for "hybrid engines" were merely a proxy for greater fuel efficiency because the legislation was distinguishing solely on the basis of whether or not the vehicles had a hybrid engine and that the only reason for this was to achieve fuel economy improvements.[115] The Second Circuit upheld this conclusion.[116] Critically, however, there is a key distinction between the City's regulation of taxis and school buses: while the City contracts for school buses and service, it does not contract for taxis or otherwise act as a participant in the taxi market, despite the industry's heavily regulated licensing scheme. Thus, while the case law suggests that the City could not mandate that private owners purchase electric cars without running afoul of EPCA's preemption provision, it may still have the authority to mandate the purchase of electric vehicles, including electric school buses, for its own use.

In assessing the "own use" preemption exemption, the District Court in *Metro Taxi I* suggested that EPCA grants narrow exceptions based on the market participant doctrine.[117] Moreover, the District Court appeared to have no objection to the Ninth Circuit's holding in *South Coast II* (under the CAA) that the fleet rules were covered by the market participant exception with respect to public purchases and private fleets with public contracts. To the contrary, it even quoted a line of the opinion that referenced the government using its own money to "acquire *or* use vehicles" (emphasis added).[118] This suggests that "use" is not limited

[114] Metro. Taxicab Bd. Of Trade v. City of New York, 633 F. Supp. 2d 83, 85-6 (S.D.N.Y 2009) [hereinafter *Metro. Taxicab II*].
[115] *Id*. at 105 (rejecting the City's revised regulations as a mandate "relating to" fuel efficiency standards).
[116] Metro. Taxicab Bd. Of Trade v. City of New York, 615 F.3d 152, 157-58 (2d Cir. 2010).
[117] *Metro. Taxicab I*, at *32 ("Defendants might be exempted from preemption if they could show that the City was a participant in the taxicab industry and that the [regulations were] not the act of a market regulator.").
[118] *Id*. at *32-33 (quoting *South Coast II*, 498 F.3d at 1045-46).

to the City purchasing the vehicles directly but includes procurement for its own use, i.e. private fleets with public contracts.

However, the decision went on to give examples suggesting that "use" depended on actual ownership, which would place public contracts for private fleets outside of the statutory "own use" savings clause. For example, the Court focused on "taking title" to the vehicles and the allocation of liability – suggesting that taxis were not for the City's own use because the City would not be liable for a pedestrian struck by a taxi.[119] However, a government contract for services could conceivably structure liability in a number of ways that would not necessarily reflect who owns the title, who is paying for the service (i.e. government funds) or what the contract is providing (a public service). The Court also believed the City acted as a regulator in part for following what resembled a regulatory rulemaking process with public notice and comment periods, concluding that this was not the process a proprietor would follow.[120] This unfortunately suggests that a court might be less likely to find that the City can make use of the "own use" provision if the City uses a transparent process to transition to electric vehicles that involves soliciting stakeholder and constituent input.

Moreover, the Court seemed to consider the market participant analysis as the end of its inquiry into the meaning of the "own use" provision, without considering whether the statutory purpose or legislative history could suggest a broader interpretation of "own use."[121] A primary purpose of EPCA was to reduce fuel dependency while preventing fragmented vehicle manufacturing markets, so critics of *Metro. Taxicab I & II* argued that the Court's interpretation greatly expanded EPCA's intended preemption provision and stifled innovative fuel efficiency

[119] *Id*. at *35-56.
[120] *Id*. at *34.
[121] *Id*. at *36 ("Defendants do not fall into either the "own use" exception to preemption under § 32919(c) or into a market participant exception.").

efforts around the country.[122] Unfortunately, legislative history on state and local preemption and the "own use" exception is very brief. However, the conference committee report asserts that "[Cities] are not constrained from establishing requirements with respect to fuel economy of automobiles *procured* for their own use" (emphasis added).[123] Government procurement policy by definition includes contracts and service provision, suggesting that the use of "obtained" in the text of the statute is intended to be at least as broad as the acquisition of contracted services and vehicles. While this definition aligns with the market participant doctrine, its intention could have been broader, as "use" could also be accomplished through renting, borrowing, sharing with someone else, or a heavily regulated licensing scheme.[124] A legislative amendment was proposed in light of *Metro Taxicab I & II* to allow fuel economy requirements in excess of federal standards for taxicabs and other licensed or otherwise authorized vehicles, but the amendment was never enacted by Congress.[125]

While it is unclear which, if either, exception is broader, the *Metro Taxicab I* analysis suggests that a city requirement that bus contractors use electric buses would fall squarely within both the own use exemption and the market participant exception. School bus companies are not merely regulated, they are contracted. A Harvard Law Review analysis of this case agreed that if New York City had contracted with a taxi company to provide services, the City could require that the taxis used for that contract meet specified fuel economy standards.[126] The City's school

---

[122] Jonathan Skinner, *Who Killed the Hybrid Car? State and Local Green Incentive Programs After Metropolitan Taxicab Board of Trade v. City of New York in the Second Circuit*, 30 STAN. ENVTL. L.J. 311, 313-14 (2011).
[123] S. REP. NO. 94-516, at 160 (1975), available at https://heinonline.org/HOL/P?h=hein.leghis/epolica0001&i=1090.
[124] HARV. LAW REV. ASS'N, *Local Government Law – Preemption – Southern District of New York Holds That New York City Hybrid Taxi Regulations are Likely Preempted by the EPCA*, 122 HARV. L. REV. 2275, 2280 (2009).
[125] CLEAN ENERGY JOBS AND AMERICAN POWER ACT COMM. REPORT, 2009 LEGIS. BILL HIST. U.S. S.B. 1733 (Feb. 2, 2010) (proposing 49 U.S.C. § 32919(d)).
[126] HARV. LAW REV. ASS'N, *supra* note 124, at 2280-81 (finding that this would "almost certainly" be the case because courts have found cities to be acting as market participants even when they were not using their own funds for nonconsensual towing services, *see* Cardinal Towing & Auto Repair v. City of Bedford, 180 F.3d 686, 696–97 (5th Cir. 1999)).

buses also serve a distinctly public purpose: transporting school age children to and from the City school system, operating along distinct routes determined by OPT and based on the needs of the City school system. In any challenge to the policy, the City should emphasize the market participant doctrine's historical application to contract arrangements for labor and services to relieve any doubts about the District Court's references to taking title and direct ownership.

VI. CONCLUSION

Overall, there are persuasive public health and climate-related reasons to transition to electric school buses and provide children with healthier, cleaner school transportation. Reductions in maintenance and fuel costs, potential cost offsets from vehicle-to-grid technology, and a variety of possible funding arrangements make the upfront costs a surmountable obstacle. The school bus system size and number of children impacted make New York City an ideal market for electric mass transportation. The City needs to conduct a pilot program to measure the benefits and work through potential issues, including upfront costs. If a pilot shows a broader transition is feasible and beneficial, the City should then phase in an electric school bus mandate. The City has the authority to implement such a mandate and withstand legal challenges under state and federal law. Given the urgency and substantial efforts needed to meet existing climate change and air quality goals, and the emergence of viable electric bus technology, New York City should begin implementing a pilot program and planning for a broader transition as soon as possible.

APPENDIX A: U.S. ELECTRIC BUS PILOTS

A. Twin Rivers, California

Twin Rivers began looking for ways to reduce carbon about four years ago and determined that eliminating diesel was a cost-effective means of achieving that goal. Working with nearby districts, Twin Rivers has acquired a fleet of twenty-nine electric buses so far.[127] It received a combination of funding from the California Air Resources Board, Local Air District, and private grants to bring the cost of the buses down to about one-third of the cost of a diesel bus, which has helped to justify the program significantly.[128] Infrastructure costs were partially covered with grant money, with the remainder paid for voluntarily by the local electric company.[129] So far, administrators have been very happy with the program. The consensus appears to be that the buses run better, children prefer the air conditioning system and smooth ride to that of a diesel bus, and the predicted cost savings from reduced fuel and maintenance are materializing.[130] In January and February of this year, the district saw fuel savings of 82 percent, and a programmable charging station ensures that buses are charged when electricity rates are low.[131] The buses are driving 50 to 70 miles per day with plenty of battery power left over after a route.[132] The district has been loaning out a few of its buses to neighboring areas for test runs to encourage further pilot programs, and plans to expand its electric fleet as additional grant money becomes available.[133]

---

[127] Interview with Tim Shannon, *supra* note 48.
[128] *Id*.
[129] *Id*.
[130] *Id*.
[131] Nicole Schlosser, *Electric School Buses Take to the Road: Real-World Results*, SCHOOL BUS FLEET (May, 15 2018), https://www.schoolbusfleet.com/article/729730/electric-school-buses-take-to-the-road-real-world-results.
[132] *Id*.
[133] *Id*; Interview with Tim Shannon, *supra* note 48.

B. Amherst, Massachusetts

Amherst introduced three electric buses as a pilot program in 2016 with the help of the Vermont Energy Investment Corporation ("VEIC"), an environmental nonprofit that assisted with feasibility studies and procurement.[134] The program is administered by the State Department of Energy Resources and was funded in large part by the Northeastern Regional Greenhouse Gas Initiative to reduce greenhouse gas emissions.[135] Concord and Cambridge school districts each received three electric buses as well.[136] A primary goal was to test electric buses in colder weather, and the use of an auxiliary heater was needed.[137] Despite an enthusiastic reception by the community, the buses encountered a number of maintenance and reliability issues that were exacerbated by inadequate customer service, training materials, and delays in shipping replacement parts from Canada, where Lion Bus is located.[138] However, these were the first Lion buses deployed in the U.S., so hopefully feedback from this pilot has provided Lion with the necessary information to improve future implementation. Additionally, the pilot had problems managing charging for the buses, both in ensuring the buses were 100 percent charged when deployed into service and in avoiding charging when electricity rates are highest.[139] VEIC recommends that districts explore networked vehicle chargers that manage charging rates across the fleet, and while they are expensive, the additional cost may be offset by lower electricity costs.[140]

---

[134] Schlosser, *supra* note 25.
[135] *Id*.
[136] VT. ENERGY INV. CORP., *supra* note 41, at 3.
[137] *Id*. at 41.
[138] *Id*.
[139] *Id*. at 42.
[140] *Id*.

C. New York MTA

The MTA's three year electric bus pilot program has begun with ten buses from Proterra and New Flyer, with plans to add sixty more.[141] The MTA leased the buses from two vendors for the pilot period, and the leases include a combination of depot charging stations and 'en route' high-power charging stations.[142] Depot charging stations will be used for overnight or midday charging, while high-power charging stations placed at hubs for multiple bus routes will reduce the need for buses to travel back to depots.[143] The electric bus pilot is being conducted in tandem with replacements to the MTA's existing compressed natural gas ("CNG") fleet of almost 800 buses, which have lower particulate emissions than diesel engines.[144] Just four months after beginning the pilot, the MTA announced plans to convert its entire fleet to electric buses by 2040.[145]

D. White Plains, New York

This school year, White Plains began a five bus pilot program operated by its existing school bus contractor, National Express. National Express approached White Plains with a plan to partner with Con Edison and Lion Bus, and handled a lengthy regulatory process to begin the pilot.[146] White Plains did not incur any additional costs to purchase the buses; the costs were shared amongst National Express, Con Edison, and the New York State Truck Voucher Incentive Program.[147] This pilot will implement vehicle-to-grid technology, with Con Edison paying for the right to use the buses as grid assets during the summer.[148] Prior to the pilot commencing,

[141] *MTA Pilot*, *supra* note 50.
[142] *Id*.
[143] *Id*.
[144] *Id*.
[145] McKenna, *supra* note 3.
[146] Interview with Joseph Ricca, *supra* note 67.
[147] *Id*.
[148] *Id*.

White Plains conducted community outreach in order to address concerns about reliability and safety. So far, the buses have proven to be high quality, comfortable, and very popular with the schoolchildren.[149] Additionally, battery life has not been an issue. Charging is done only at the lots and there has not been a need for additional charging infrastructure at the schools or elsewhere.[150] The district also does not anticipate needing a second battery source for heating or cooling.[151] The district does not appear to be having the maintenance issues that Amherst had with Lion buses. White Plains plans to convert at least half of its school buses to electric, and right now the main issue with scalability is the upfront purchase price.[152]

[149] *Id*.
[150] *Id*.
[151] *Id*.
[152] *Id*.