June 22, 2017

Commissioners Bryan W. Shaw, Ph.D., P.E.; Toby Baker; and Jon Niermann
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Re: BYD Comments on Texas’ Use of Environmental Mitigation Trust Funds

Dear Commissioners Shaw, Baker, and Niermann:

BYD America (“BYD”) appreciates the opportunity to submit the following comments that we believe will help Texas successfully and cost-effectively meets its air quality goals via broad, multi-sector deployments of zero-emission vehicles and equipment. Such deployments will take advantage of this unprecedented opportunity to reduce mobile source emissions and, in particular, provide both near- and long-term nitrogen oxide (NOx) emissions reductions in those areas that bear a disproportionate share of the state’s air pollution burden.

BYD is a global company that is changing what is possible in zero-emission transportation. Our commitment to “solve the whole problem” has made BYD an industry pioneer and a leader in not only the transportation sector, but also high-efficiency energy storage, solar power, LED lighting, and information technology. BYD and its shareholders, including Warren Buffett, see these environmentally and economically forward products as the way of the future. BYD has also been working with a number of vehicle operators – including numerous transit agencies – throughout Texas on developing zero emission solutions for their bus and truck fleets.

Resiliency and sustainability are increasingly important environmental issues. Conventionally fueled vehicles, including those supporting first responders and public transport, can be rendered all but useless as delivery of fuel was impossible in the days and weeks following a natural disaster. In those trying times, electric vehicles capable of supporting multiple power transfer pathways – vehicle-to-grid (V2G), vehicle-to-vehicle, and vehicle-to-load – would be invaluable. BYD’s technology and charging system provides just such flexibility, effectively turning each BYD vehicle into a mobile power plant capable of supporting first responders in emergency scenarios or utilities in power outages. This yields substantial benefits in safety, durability, cost-effectiveness, and facility factors, while still meeting the demands of heavy-duty fast charging.

Our North American headquarters and manufacturing facilities are located in Southern California. We are vertically integrated in order to better control the quality and costs throughout the manufacturing chain – we produce every major vehicle component, including our 100% recyclable batteries, inverters, and traction motors. This business structure ensures seamless communication and efficiency across components, which creates a better operational experience and competitive pricing.
Our recommendations for Texas fall into three categories:

- Concentrate funding for projects based on the largest sources of statewide NOx emissions
- Provide support for transformative technologies in areas disproportionately burdened with air pollution
- Leverage Volkswagen funds by aligning projects with other state initiatives to yield economic, emissions, and energy benefits

BYD urges the Texas Commission on Environmental Quality to take these recommendations into consideration, which will enable Texas to most efficiently and effectively make the most of its allocation of Volkswagen funds.

**Texas Should Concentrate Funding for Projects Based on the Largest Sources of Statewide NOx Emissions**

As the figure below shows, on-road diesel vehicles and non-road diesel equipment (excluding locomotives and marine) should be the state’s primary focus for these funds as they account for 80% of the state’s NOx emissions from mobile diesel sources.

![NOx Emissions (Tons, 2014)](chart)

The on-road sector is particularly important as 52% of the state’s mobile diesel NOx emissions come from this source. Texas should thus ensure that its funds are allocated to address these emissions sources. To do so, Texas can target transit and shuttle buses as well as delivery, cab forward, and tractor trucks, many of which are “captive” fleets that operate almost entirely within dense communities or areas overburdened with air pollution (e.g., ports and terminals) and are thus capable of delivering immediate environmental benefits.
Allocating funds to cargo handling equipment will address non-road diesel equipment emissions. These pieces of equipment operate entirely within ports, rail yards, depots, and terminals – areas that Texas has consistently addressed due to environmental justice concerns stemming from disproportionate air pollution impacts.

In particular, focusing funds on terminal tractors (also referred to as yard tractors, yard hostlers, or yard trucks,) presents Texas with a viable solution to addressing non-road diesel emissions. Terminal tractors move freight quickly and efficiently through the Ports of Houston, Galveston, and Corpus Christi, as well as inland terminals. However, this efficiency is at the cost of clean air because terminal tractors typically use older, high-emitting diesel engines. Texas can therefore make an immediate and lasting impact on local air quality in these disproportionately burdened areas by electrifying these terminal tractors.

**Texas Should Provide Support for Transformative Technologies in Areas Disproportionately Burdened with Air Pollution**

Texas' air quality issues have led to the designation of two ozone nonattainment areas in the state, which include seventeen counties – Brazoria, Chambers, Collin, Dallas, Denton, Ellis, Fort Bend, Galveston, Harris, Johnson, Kaufman, Liberty, Parker, Rockwall, Tarrant, Waller, and Wise – that are home to 12.2 million residents.² Within these areas are Texas' leading population centers of Houston, Dallas / Fort Worth, San Antonio, Austin, and Galveston. By directing funding to vehicles operating in these areas, Texas can immediately reduce harmful NOx emissions, thereby generating environmental, health, and economic benefits.

One such funding strategy is to electrify trucks and transit buses operating in Texas' population centers or along key corridors, such as I-84, I-91, and I-95. Electrified vehicle technologies produce zero emissions, eliminate the need for expensive-to-maintain particulate traps, and mitigate the need for oil changes. To combat non-road diesel emissions, Texas can allocate funds to electrify the state's cargo handling equipment projects.

**BYD Solutions**

Electrified on-road trucks, such as BYD's various Class 5, 6, and 8 models, create additional benefits for the environment and operators alike, as shown in Table 1 below. Each of these models presents customers with a basic chassis readily available for customization. BYD works with top outfitters and upfitters to meet customer specifications; thus, each of our chassis can be outfitted into a dry box, flatbed, stake bed, refrigerated unit, and refuse truck version.

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### Table 1: What Sets BYD On-Road Trucks Apart

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Models¹</th>
<th>Battery Performance</th>
<th>CO2 Reduced per Truck (tonnes)</th>
<th>Annual Fuel Savings</th>
<th>Annual Maintenance Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class 5 Medium-Duty Truck</strong></td>
<td>5D, 5F</td>
<td>155 mile range</td>
<td>340</td>
<td>$6,000</td>
<td>$4,000</td>
</tr>
<tr>
<td><strong>Class 6 Medium-Duty Truck</strong></td>
<td>6D, 6F, 6R</td>
<td>124 mile range</td>
<td>450</td>
<td>$8,200</td>
<td>$4,600</td>
</tr>
<tr>
<td><strong>Class 8 Heavy-Duty Truck</strong></td>
<td>8TT, 8R, 8TS, and 8TT</td>
<td>92 mile range</td>
<td>636</td>
<td>$9,600</td>
<td>$4,500</td>
</tr>
</tbody>
</table>

As the world's largest producer of battery electric buses, BYD has demonstrated experience and established customer delivery and deployment processes. Indeed, BYD has deployed more than 12,000 zero-emission buses internationally and has received orders for over 20,000 additional buses. These buses have accumulated more than 150 million miles of service, saved over 27 million gallons of diesel, and reduced 625 million pounds of greenhouse gases (GHGs).

BYD's product line of seven bus and coach models, ranging from 23' coach buses to 60' articulated transit buses and everything in between, are American Disabilities Act and Buy America-compliant. They can therefore help transit agencies in Texas reduce fuel costs and minimize maintenance expenses, thereby increasing reliability and performance. Due to the increased miles put on transit buses, these vehicles see even more substantial maintenance and fuel savings than our trucks. BYD's standard 40' bus experiences yearly savings on the order of $45,000 per bus. Further, BYD's recyclable battery technology enables these vehicles to operate as much as 220 miles on a single charge, all while producing zero emissions.

BYD's model 8Y terminal tractor is a 100% battery-electric class 8 truck that is capable of 15 hours of continuous operation between charges with minimal battery degradation. Each terminal tractor eliminates 1,590 metric tons of CO2 over its deployment lifetime. Related to the vehicle's hugely beneficial total cost of ownership, the T8Y saves operators $19,100 in fuel costs and $8,800 in maintenance costs per truck each year – lower downtime, fewer moving parts, less wear and tear, and improved environmental efficiency are the hallmarks of BYD's T8Y terminal tractor. Further, they are able to be deployed immediately as they are compliant with Federal Motor Vehicle Safety Standards (FMVSS). ⁴

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¹ "D" stands for "Delivery."
² "E" stands for "Forward / Cab Forward."
³ "R" stands for "Refuse."
⁴ "TS" stands for "Tractor Single."
⁵ "TT" stands for "Tractor Tandem."
⁶ The T8Y is also compliant with Canadian Motor Vehicle Safety Standards (CMVSS).
Finally, as electric vehicles required dedicated charging infrastructure, Texas has already participated in initiatives such as the Texas Emissions Reduction Program’s EV rebate and the Texas River Cities Initiative to tackle this issue, and BYD stands ready to align with and further support those initiatives. Where BYD’s technology exceeds the capabilities of our competitors is the design and capability of our AC chargers; specifically, our AC charging is all done on-board the vehicle. This on-board charging approach:

- Eliminates installation of large, expensive, hot DC charging stations with external converters, since that conversion is done internally;
- Virtually eliminates heat loss, so the charging system converts more of the current to motive energy;
- Virtually eliminates overheating, so charging can occur in all temperatures – in other words, there are no cold weather limitations on the technology;
- Eliminates the need for costly charger cooling systems;
- Virtually eliminates charger maintenance and increases charger durability, so there's no need for replacement during the life of the vehicle or for many years after;
- Significantly diminishes electrical and heat hazards to staff; and
- Allows the chargers to be compact, easy to operate, easily installed with minimal space, engineering or permitting and even easily moved as needs change.

**Texas Should Leverage Volkswagen Funds by Aligning Projects with Other State Initiatives to Yield Economic and Energy Benefits**

The nearly $200 million allocated to Texas is an opportunity for the state to transform its transportation sector. Simply replacing existing diesel vehicles with new (but still conventional fuel) technology may yield limited benefits, but it will do very little in leading the state towards a cheaper, cleaner, and more reliable energy future with greater energy independence. Electric vehicles, however, offer the means to achieve energy security and environmental sustainability while simultaneously creating a driver for economic growth.

BYD’s electric vehicle deployment experience will provide the state with the means to cost-effectively and efficiently expand its electric vehicle fleet. As an example, BYD has deployed over 12,000 transit bus and motor coaches internationally.

Electric vehicle deployments will increase domestic energy security by offering drivers and operators a choice of fueling options. According to the Electric Drive Transportation Association, domestically produced grid electricity, on average, can power plug-in vehicles at the equivalent of $1 a gallon of gasoline. Importantly, this pricing structure is stable as it is insulated from the global volatility that impacts diesel.²

To that end, Texas should allocate funding to align with its key state and environmental agency initiatives; specifically, this includes the Texas Emissions Reduction Plan and the Texas River Cities Initiative.

Texas Emissions Reduction Plan

As identified in the most recent Texas Emissions Reduction Plan Biennial Report, one of Texas’ main environmental quality goals is the reduction – especially in non-attainment areas - of NOx, which are a main precursor to ground-level ozone. To reduce NOx emissions from its transportation sector, Texas established a multi-faceted approach, which included a call for investments in clean fuels, vehicles, and infrastructure.

Electrified vehicles, particularly those using advanced battery technologies, seamlessly align with the Texas Emissions Reduction Plan. BYD’s mission to create safer and more environmentally friendly battery technologies has led to the development of the BYD Iron Phosphate (“Fe”) Battery. This fire-safe, completely recyclable and incredibly long-lasting technology has become the core of BYD’s clean energy platform and is used across our product lines, including automobiles, buses, trucks, utility vehicles, and energy storage systems. The battery is the only environmentally-friendly option available on the market today as it contains no heavy metals or toxic electrolytes. Additionally, BYD batteries can be recycled or repurposed into energy storage systems for other applications. This broad but in-depth expertise is a reflection of our commitment to sustainability and reducing our carbon footprint.

Texas River Cities Initiative

Texas has committed to provide cleaner, cheaper, and more reliable transportation energy, which will in turn help the state meet its air quality goals. To that end, the municipalities of Austin and San Antonio participated in the Texas River Cities Initiative to increase the number of electric vehicles in the state and build out the state’s electric vehicle charging infrastructure.

While these efforts target the light-duty vehicle passenger vehicle market, BYD offers commercially available products in three specific markets – transit buses, on-road trucks, and cargo handling equipment – that will lead to dramatic NOx emissions reductions in Texas. With multiple equipment models in each of those markets, BYD can thus immediately provide Texas with a variety of transportation options that will yield tremendous and cost-effective environmental and economic benefits. Further, Texas can use its allocated Volkswagen settlement funds to take the next step by creating opportunities for electric vehicles in the medium- and heavy-duty markets.

Closing Remarks

The commercial-scale heavy-duty electric transportation market is rapidly maturing, as demonstrated by the price reduction of more than 20% in our bus products over the last
five years. This Volkswagen opportunity represents a unique chance to create immediate emission and economic benefits for Texas’ residents, as well as build the groundwork for a sustainable electric transportation marketplace.

The economic, emissions, and energy-specific benefits of electrified equipment are clear—all-electric trucks, buses, and equipment generate no tailpipe emissions while, over the lifetime of the vehicles, deliver a lower total cost of ownership than conventional petroleum fuels and natural gas.

BYD believes early-market incentive funding is critical to achieving more favorable upfront economics and that increasing sales will lead to cost-competitive purchase prices. We have committed to and successfully delivered substantial price reductions from our first generation of products. We hope to continue this progress in Texas and support the state in addressing a broad spectrum of environmental issues, resiliency and sustainability chief among them.

BYD thanks the State of Texas and the Texas Commission on Environmental Quality for the opportunity to submit these recommendations. We would like to work with you and your team to ensure an efficient and effective rollout of the State of Texas Mitigation Plan.

Towards that end, we request an in-person meeting to discuss our recommendations further. We look forward to future collaboration that will help Texas meet its environmental, fiscal, and social justice goals.

Sincerely,

Zachary S. Kahn
Director of Government Relations
BYD America

CC: Executive Director Richard A. Hyde, P.E.
Deputy Director Steve Hagle, P.E.