



Electric Vehicles –Three Hurdles to Consumer Adoption

In spite of COVID-19, electric vehicles (EVs) are continuing to grow exponentially in total sales and market share. The one ingredient that is critical to EV sales that is still lacking is public charging stations, at least from the perspective of EV drivers. A [recent study](#) by the [Georgia Institute of Technology School of Public Policy](#) utilized a machine learning algorithm to look at consumer sentiment data regarding charging station choices. Unsurprisingly, one of the biggest hang-ups for potential EV drivers is vehicle range (“range anxiety”). This has been compounded primarily by the **type** of charging stations available more than the quantity of charging stations available. There were several interesting findings from the study:

- Sentiment around EV charging in dense urban centers was 12%-15% worse than in non-urban locations – a surprising finding at first glance.
- The highest-rated charging stations were generally located at hotels, restaurants, and convenience store, followed by public parks and recreation facilities.
- Workplace and mixed-use residential charging stations were rated the lowest.
- There was little to no difference in sentiment of public vs private charging stations.

Generally, the biggest complaints for any EV charging station deployments centered around availability (are there enough stations?), signage (can I find a station), and equipment status (are the stations working?). In the end, the study found that even in urban centers where charging stations would be expected to be plentiful, these perceptions are still a barrier to EV adoption. For those of us who build and deploy chargers, these are good lessons to understand.



Vehicle to Grid (V2G) Charging, Part Two – School Bus Fleets

Our [last newsletter](#) discussed the concept of vehicle to grid (V2G), and why it is compelling for both utility operators and fleet EV operators. In this newsletter, we will explore one use case for V2G – electrified school bus fleets. In many respects, school buses represent one of the best use cases for V2G. Buses tend to drive around 100 miles on a route, and they can easily be recharged between driving cycles (in the 6-8 hours between the start of school and the end of school, and then again during the night). The end of the day “off period” also coincides nicely with peak electric usage hours in most large cities, which means that all of the unused power on the buses can be put back onto the grid at a premium.

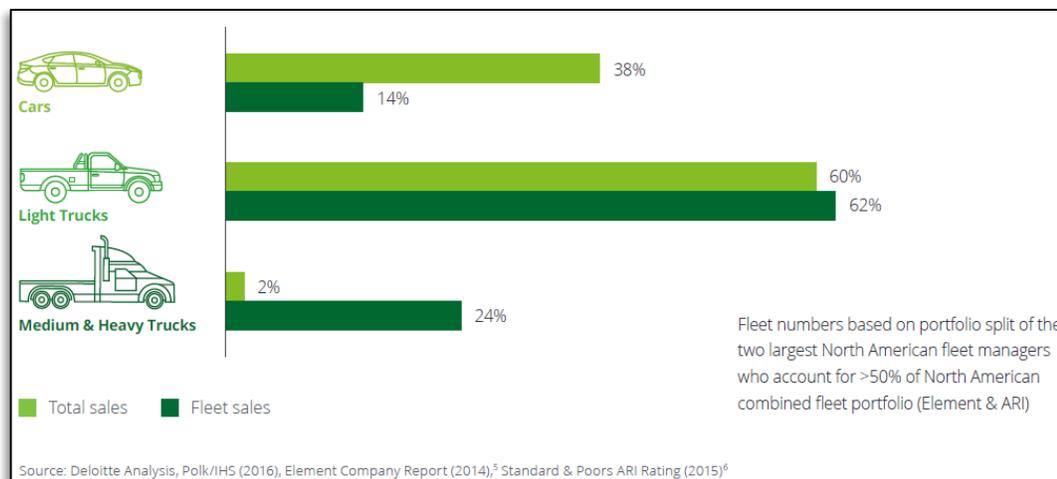


[Dominion Energy](#) in Virginia recently started a joint program with a number of local school districts to replace 1,050 diesel buses with electric buses over the next five years. The first 50 buses will go into service this year, followed by 200 buses per year for the next five years. Critically, the chargers for these buses will be V2G capable. With the average school bus having a capacity of 100kWh to 150kWh, that is a lot of power that can be put back onto the grid, especially during power outages or in emergencies. Of course, the electric buses are also expected to have significantly lower maintenance costs than the diesel buses that they will be replacing, and each replaced bus will cut CO2 emissions by about 54,000 pounds per year – that is over 55 million pounds of CO2 across the 1,050 bus fleet. This is environmentally significant, especially given that school buses outnumber public transportation buses by about 5 to 1!

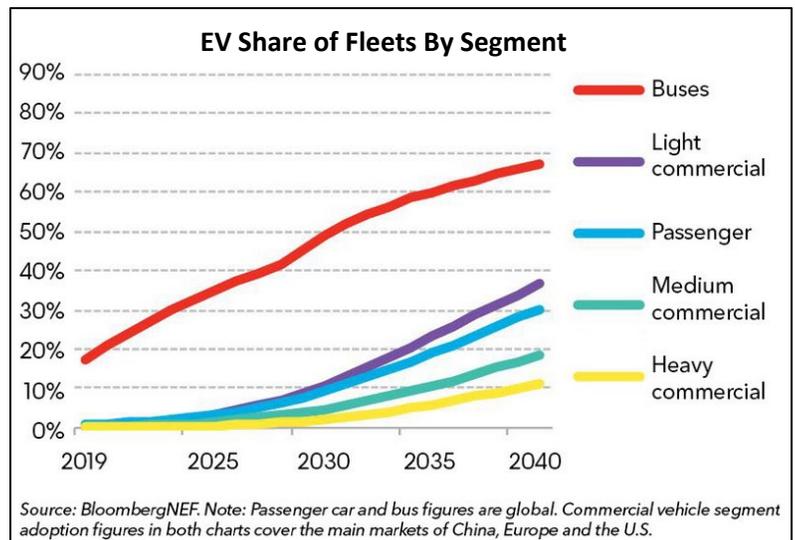
While school buses probably represent one of the best use cases for V2G, other vehicles such as delivery trucks have similar use cases – they are used mainly during the day and are “back in the barn” during peak usage hours. If you would like help determining if your fleet could benefit from V2G technology to reduce your energy costs, [reach out to us](#) and we will be happy to help you analyze your specific use case.

Why Consumer Charging Options May Not Be Great for Fleet Operators

While sales of consumer autos look like they are in a long-term decline (and this was before COVID-19), fleet sales are growing and are expected to continue doing so. In the US alone, fleet sales have grown by nearly 19% between 2012 and 2019. The percentage of total vehicle sales that fleets consume has also grown,



from 17.1% of all vehicles in 2013 to 19% of all vehicles in 2019 according to a recent [Cox Auto study](#). According to [Deloitte](#), light trucks are the most-purchased fleet vehicles, followed by medium-heavy duty trucks and automobiles. Just as interestingly, the share of EVs in fleets also continues to grow, with buses leading the charge. [Bloomberg NEF](#) expects that electric buses will represent 81% of the municipal buses worldwide by 2040 and expects that 56% of light trucks and 31% of medium-duty trucks will be electric by 2040.



This begs the question of where these vehicles will be charged. While utilizing someone else’s chargers might seem attractive to fleet operators (after all, that is essentially what happens with gasoline vehicles and gas stations), the impact of some of the issues discussed in our first story will impact fleet EV operators even more so than consumers. If a commercial vehicle cannot be charged, there are likely to be significant revenue impacts, and most businesses do not want to bet their top line on the availability of public chargers.

If you are a fleet operator looking to electrify your vehicles, the best consideration is likely either buying your own chargers or leasing chargers which are installed where your vehicles are parked when they are not operating. V2G technology is also something that could also make sense for your fleet since, depending on the use case, it may significantly reduce fleet energy costs. But most of all, high reliability is the most critical factor that fleets should utilize when selecting chargers for their fleet. Our white paper “Designing Charging Infrastructure to Maximize Electric Vehicle Fleet and Charging Network Reliability and Availability” can provide more ideas to consider – [let us know](#) and we will send you a copy.

Quick Notes from the Electric Vehicle (EV) Ecosystem

Some interesting links to stories in the EV ecosystem during the month of June 2020:

- [Germany earmarks 500 million euros for electric car charging](#)
- [Investors bullish on EV charging despite slowdown in car sales](#)
- [EV charging, carbon reduction included in \\$500B transportation infrastructure bill](#)
- [BMW and China’s state grid partner on EV charging network expansion](#)
- [Electric vehicle charger market to garner \\$25.5 billion by 2027](#)
- [Volta partners with local officials to deliver critical community announcements](#)
- [Mercedes-Benz electric vehicle charging service now integrated with BP Chargemaster’s Polar Network](#)
- [Germany to require all gas stations to offer electric vehicle charging](#)

- [Global EV market: Already on the road to recovery?](#)
- [Smart EV charging could have helped save £133m in power grid costs during pandemic lockdown'](#)
- [V2G to boost charging efficiency](#)
- [Elon Musk: It's time to bring the Tesla Semi to volume production](#)
- [A million-mile battery from China could power your electric car](#)
- [Meet Nicola, the electric vehicle stock that traders believe is as valuable as Ford](#)
- [Ford, VW finalize alliance to build vans, pickup, electric vehicle](#)

About Rhombus Energy Solutions

Rhombus develops and manufactures next-generation bi-directional electric vehicle charging infrastructure, high-efficiency power conversion systems, and energy management system (EMS) software for vehicle-to-grid (V2G) capable electric vehicle fleet charging, energy storage, and microgrid applications. The high reliability of our solutions is the result of decades of experience developing high-power systems for a variety of applications and deployment scenarios, including UL-1741SA system-to-grid solutions. For more information, please visit www.rhombusenergy.com.

