



Rhombus, Blue Bird, and Nuvve Commission 60kW V2G School Bus Charging Solution in Pekin, IL

This Tuesday, the Pekin, IL school district commissioned one of the first production vehicle-to-grid (V2G) solutions put into production. The solution consists of a [Blue Bird electric school bus](#), [Nuvve's GIVE intelligent grid services aggregation platform](#), and a [Rhombus Energy Solutions 60kW bi-directional DC fast charger](#) and [EV dispenser](#). The solution was sold to the local school district by [Central States Bus Sales, Inc.](#) The Nuvve-branded charger and dispenser shown here are built by Rhombus Energy Solutions.



“The electrification of school buses is critical to the efforts to reduce greenhouse gases and particulate emissions, while reducing energy and maintenance costs versus diesel buses,” said Trevor Rudderham, SVP of electrification at Blue Bird Corporation. “Rhombus Energy Solutions’ bi-directional DC fast chargers amplify these advantages of electric buses by enabling vehicle-to-grid operation, which further reduces vehicle energy costs and can help with utility grid resiliency.”

There are over 480,000 school buses in the US, and over 95% of these buses run on diesel fuel, according to the [US PIRG](#). Vehicles running on diesel fuel are generally regarded as the worst polluters in the transportation sector, with the [US Environmental Protection Agency](#) classifying diesel exhaust as a likely carcinogen. It is estimated that 5.3 million tons of greenhouse gases are emitted each year by diesel school buses. Worse yet, the children riding school buses are exposed to these carcinogens as they ride to school and back to their homes. This is why electrifying school buses is such a priority in the battle to reduce air pollution and greenhouse gases. The upside is that V2G can play a significant role in making that happen. US PIRG found that electric school buses utilizing V2G can save up to \$130,000 over the lifetime of an average school bus. When combined with the maintenance savings that electric vehicles realize and the grant programs available, electric school buses become very attractive.

Battery Power Comes to Heavy Construction Equipment

One of the last (and most difficult) vehicle classes to electrify is construction equipment. The reason for this is often the difficulty of deploying the needed charging infrastructure to construction sites. Unlike vehicle yards for other medium- and heavy-duty vehicles, construction sites are seldom fixed locations – they move as buildings are completed. The availability of any significant power infrastructure at these sites can also be impaired or even unavailable.



And yet, heavy construction equipment vehicle manufacturers are moving forward on the electrification of their equipment. This is driven in part by the fact that construction equipment is globally responsible for 11% energy-related carbon emissions. A recent example of this is the [CASE 580 EV backhoe](#). The backhoe utilizes a 480 volt, 90kWh electric battery that drives both the vehicle drivetrain and hydraulic motors. According to CAE, the 580 EV backhoe has performance equal to or greater than that of diesel backhoes, but with significantly lower operating costs and no emissions.

Examples of other companies that are electrifying their construction equipment include:

- [Volvo CE](#) introduced their EX2 electric compact excavator in 2017. The vehicle has 38kWh of battery power storage, allowing it to operate for up to eight hours. Other vehicles that Volvo CE is electrifying include the EC15 and EC27 compact excavators, as well as the L20 and L28 wheel loaders.
- [Bobcat](#), known for their compact loaders, have also begun to electrify their compact excavators. The [Bobcat E10e](#) electric excavator can operate for a full 8 hours from its 12.7kWh battery.

Rhombus is working with a number of heavy construction equipment manufacturers to design and develop portable charging solutions that can be charged offsite, and then driven to the construction site to charge heavy construction equipment.

Electrification Takes Center Stage in US Economic Recovery Efforts

Recovering from the economic impact of COVID-19 is one of the top priorities of the Biden Administration. Another is reducing US greenhouse gas emissions, something that was put on the back burner (if not taken off of the stove completely) during the previous administration. Interestingly, the electrification of transport can help to address both of these issues. This is one of the drivers of the [CLEAN Future Act](#) currently working through the US House of Representatives. The bill has the goal of transitioning the US to 100% clean energy by 2035, and an intermediate goal of reducing greenhouse gas emissions by 50% by 2030. It includes \$500M in funding towards the deployment of electric vehicle support equipment (EVSE), \$2.5B annually for zero-emission school buses, and \$2B annually to reduce emissions at US ports.

But Supercars Holding Out On Electrification

As more and more automakers transition to battery electric vehicles, one of the areas that has proven “uneven” in this transition are sports cars, especially the “supercars” or “hypercars”. One of the examples of this is [the Porsche 911](#). While the company expects to electrify 80% (or more) of their vehicles by 2030, the Porsche 911 is still not on the list, and may never be fully electrified according to Porsche CEO Oliver Blume. Reasons for this vary, but for many car enthusiasts, hearing the roar of a gasoline engine when they hit the gas pedal is an important part of the experience.



[Ferrari](#) (perhaps the leading supercar manufacturer) is also taking a similar path. Ferrari CEO Louis Camilleri stated that Ferrari will not have its first all-electric car until 2025. He cites battery technology as the key issue, especially around recharge times. Ferrari has set their sights on moving their vehicles to hybrid drivetrains, with the SF 90 Stradale (released earlier this year) being the first one to make the move. This puts Ferrari about nine years behind [McLaren Automotive](#) who released their first hybrid car (the McLaren P1) in 2012.



Six Utilities Working to Expand Fast Charging Locations in the US

The Electric Highway Coalition, which consists of the utilities American Electric Power (AEP), Dominion Energy, Duke Energy, Entergy Corporation, the Southern Company, and the Tennessee Valley Authority, [announced](#) that they would build a number of EV charging stations utilizing DC fast chargers on major highways in the eastern US. The goal of deploying these charging stations is to reduce range anxiety for drivers of EVs. The TVA is putting up to \$40M into this program over the next five years, while AEP Ohio is investing \$10 to field 375 charging stations. Similarly, Duke Energy has recently installed 570 EV public DC fast charging stations in Florida. This matches moves by Electrify America, who stated that they would install 3,500 DC fast charger across 800 stations by December 2021, and EVGo’s plans to deploy fast charging stations across 34 states.

Quick Notes from the Electric Vehicle (EV) / Energy Storage Ecosystem

- [Rivian's Adventure Network will include 3,500 exclusive DC fast chargers](#)
- [BMW i4, with 300 miles of range, to go on sale this year](#)
- [EVgo Announces New Partnership with Meijer to Install EV Charging Stations at Grocery Store Locations](#)
- [The US House's Clean Future Act is loaded with pro-EV policies](#)
- [Utilities to build network of EV charging stations](#)
- [BP, Volkswagen join for rapid rollout of Europe's EV charge infrastructure](#)
- [Commentary: With open standards, U.S. can build EV charging infrastructure faster](#)
- [U.S. lawmakers propose giving USPS \\$6 billion for electric delivery vehicles](#)

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-1741-SA system-to-grid solutions. For more information, please visit www.rhombusenergy.com.

