
# Electric School Bus Business Models Guide

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## ACKNOWLEDGMENTS

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### FOR ADDITIONAL INFORMATION OR QUESTIONS

**Please visit:**
https://www.wri.org/initiatives/electric-school-bus-initiative

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*Cover photo*: Katherine Roboff

## About WRI's Electric School Bus Initiative

In collaboration with partners and communities, WRI's Electric School Bus Initiative aims to build unstoppable momentum toward an equitable transition of the U.S. school bus fleet to electric by 2030, bringing health, climate and economic benefits to children and families across the country and normalizing electric mobility for an entire generation.

## Purpose of this Guide

This document is provided as a resource for school districts to identify the appropriate business model to support electrification of school transportation in their district. Electrifying school buses presents districts with the opportunity to assess their existing arrangement of roles, responsibilities and costs – in other words, their business models – and consider a bevy of new options that have emerged in the school transportation market. This guide defines key electric school bus roles and presents benefits and considerations that districts can weigh when assigning responsibility for each role. It then lays out a framework for the business models that result from assignment of these roles. Key questions to guide discussions are provided at the end. For additional context as well as further discussion of why electrification poses an opportunity to reconsider school transportation business models, please refer to the WRI blog, "*An Electrifying Decision: Which Electric School Bus Business Model is Right for Your District?*"

# Selecting the Right Business Model for Your District

To understand business model options, districts need to identify the assets (buses and infrastructure) and associated roles of bus electrification; consider ownership options and stakeholders; and weigh their appetite to absorb risk and make the most of opportunities. Schools are already on the lookout for available funds (local, state, federal, utility); by considering complementary financing and new business models they can leverage these funding resources for greater impact.

**What is a Business Model?**

The arrangement of roles and responsibilities for achieving a business objective; this can include asset ownership, revenue sources, details of financing and assignment of risk. In the case of school transportation, this covers district decisions like whether to own, lease or contract out for vehicles and how operator and maintenance functions are staffed.

# Business Model Considerations: Challenges and Opportunities for Underserved Communities

School districts, especially those in underserved communities, understand that it is essential to transition to clean transportation options to mitigate the disproportionate harms from air pollution and climate change borne by low-income communities and communities of color. However, districts operating in underserved communities may face exacerbated challenges when making this transition due to limited access to low cost capital, lack of resources and capacity to undertake projects and underinvested local electric distribution infrastructure.

Despite these hurdles, the transition to electric transportation is anticipated to deliver outsized benefits to underserved communities. The operational savings and revenue generation opportunities posed by electric school buses will go further to support district priorities in places where resources are scarcer. Pursuing transportation electrification can also jump-start workforce development and training that ensures a community is included in the green economy of tomorrow. Districts, especially those in underserved communities, can use the business model selection process to identify the business model that best addresses their principal challenges and maximizes the benefits that are most salient in their specific context.

# Roles within Electric School Bus Business Models

Six key roles for electric school bus business models are illustrated in Figure 1, though other variations exist. Contracts (e.g. ownership, lease agreements, service agreements, master services agreements, or energy savings performance contracts) formally assign responsibilities, duties, obligations and benefits across the roles and elements of each business model. Technical advisors, such as a third-party review entity, can help fill any knowledge gaps and can review contracts to ensure that all liabilities are assigned appropriately when there are multiple partners involved in a project.

Table 1 below presents several types of business models emerging for school bus electrification and the parties responsible for different roles under each model. One entity can cover multiple roles, and there is often more than one type of entity that can serve in a given role, so districts must weigh tradeoffs between potential approaches. The term "3rd party" refers to any entity that is not a school district, including original equipment manufacturers (OEMs), school bus contractors, private energy companies, a local electric utility, etc.

FIGURE 1 | **Roles within School Bus Business Models**

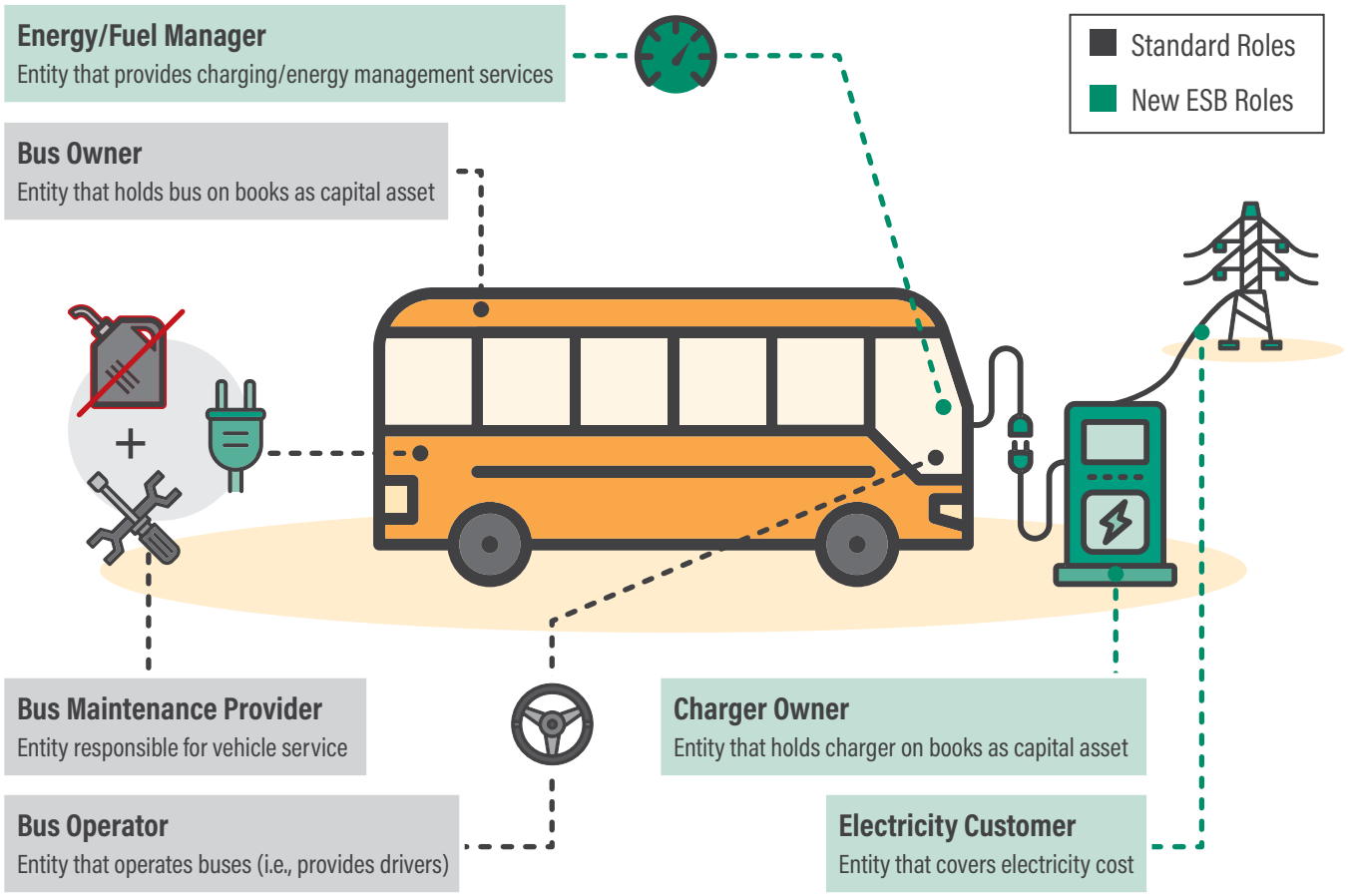

TABLE 1 | **Taxonomy of Electric School Transportation Business Models**

| | BUSINESS MODELS | | | | |
|---|---|---|---|---|---|
| | Roles within all business models | | Roles that are specific to electrification | | |
| | Bus owner (& maintenance) | Bus operation | Charger owner (& Maintenance) | Energy manager (software) | Electricity Customer |
| **School ownership** | **SD** | **SD** | **SD** | **SD or 3rd party** | **SD** |
| **Lease** | 3rd party | SD | SD | SD or 3rd party | SD |
| **Charging-as-a-Service** | SD | SD | 3rd party | 3rd party | SD |
| **Turnkey asset management** | 3rd party | SD | 3rd party | 3rd party | 3rd party |
| **Transportation-as-a-Service** | 3rd party | 3rd party | 3rd party | 3rd party | 3rd party |

*Note*: "SD" refers to school district; "3rd party" refers to any entity that is not a school district, including OEMs, school bus contractors, private energy companies, a local electric utility, etc.

### The possibilities are endless...

The Taxonomy presented in Table 1 does not encompass all potential combinations of roles or business model variations for the provision of electric school bus transportation. Taking cues from the transit and energy efficiency sectors, districts can explore battery leasing like Valley Regional Transit, or inclusive utility investments for on-bill financing of electrification as the DTE Electric Company has proposed under the guidance of Clean Energy Works.

## Next, we will look at those roles in more detail

TABLE 2 | **Bus Owner**

**Bus owner:** the entity that holds the bus on its books as a capital asset. Note that the owner of the bus, such as the district, may be a separate entity from the owner of the battery, such as a utility.

| BUS OWNER | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | ▪ Can utilize district's own low-cost capital if available<br>▪ Ability to specify vehicle characteristics | ▪ Technology performance issues outside of warranty terms are the responsibility of district |
| **3rd party** | ▪ Mitigates high upfront capital outlay of an ESB (3-4x > than diesel)<br>▪ Bulk procurement price<br>▪ Technology performance is guaranteed | ▪ Potential extended commitment via long-term contract<br>▪ May be asked to forgo potential revenue opportunities (e.g. vehicle-to-grid [V2G] payments) & lower future ESB costs |
| **Remember that...** | *District ownership may be infeasible for underserved districts and/or those without access to low-cost capital or incentives* | |

TABLE 3 | **Charger Owner**

**Charger owner**: the entity that holds the charger on its books as a capital asset. Note that an operational charger often requires additional infrastructure (e.g. conduit, panel, etc.) on the customer's side of the meter. The owner of the customer-side infrastructure may be a distinct entity from the owner of the charger, such as a utility. Likewise, the entity responsible for charger maintenance may be a distinct entity from the owner of the charger.

| CHARGER OWNER | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | • Can utilize district's own low-cost capital<br>• Can control all specifications<br>• Can integrate into any existing energy/fleet management systems | • Technology performance is responsibility of district<br>• May be some learning lag as staff/district get accustomed to new role |
| **3rd party** | • Mitigates the high upfront capital outlay of infrastructure<br>• Bulk procurement price<br>• Technology performance is guaranteed | • Potential extended commitment via long-term contract<br>• May be asked to forgo potential revenue opportunities from electricity markets (e.g., V2G payments) |
| **Remember that...** | *District ownership may be infeasible for underserved districts and/or those without access to low-cost capital; utility ownership may result in costs borne by all electricity ratepayers* | |

TABLE 4 | **Bus Operator**

**Bus operator**: the entity that operates the buses – providing drivers and planning routes.

| BUS OPERATOR | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | • Comfort with standard role<br>• Better able to monitor and ensure safe and healthy conditions for drivers and students<br>• Investment in workforce and skills development | • May be some learning lag as drivers adjust to new technology |
| **3rd party** | • More flexible contract arrangement<br>• Driver performance is not district's responsibility | • Less insight into and influence over operating conditions for workers. These can vary widely: health insurance premium increases, wages (e.g. COVID-related increases) and training costs |
| **Remember that...** | *Improving working conditions will have outsized benefits to women, who are highly represented among bus drivers, monitors, and other bus-riding workers. Additionally, improving working conditions can help retain workers and attract new ones, especially from historically excluded communities* | |

TABLE 5 | **Bus Maintenance Provider**

**Bus maintenance provider**: the entity responsible for scheduled and unscheduled service of the vehicles to enable optimal performance and extend their lifetimes.

| BUS MAINTENANCE PROVIDER | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | ▪ Better able to ensure safe and healthy working conditions<br>▪ Absorb larger share of maintenance & repair savings generated by ESBs<br>▪ May provide greater job stability, quality, and training for school bus mechanics | ▪ May be some learning lag as staff adjust to new technology<br>▪ Maintenance costs may have some variability |
| **3rd party** | ▪ More flexible contract arrangement<br>▪ Repairs and unanticipated costs are not district's responsibility | ▪ May result in less skills development for staff in ESB maintenance<br>▪ Under some arrangements repairs may require coordination, introducing potential for delay<br>▪ Maintenance & repair savings (as compared to diesel) may not be fully passed on to district |
| **Remember that...** | *Improving working conditions will have outsized benefits to Latino workers and workers without 4-year degrees, two groups that are highly represented among bus mechanics & technicians* | |

TABLE 6 | **Energy/Fuel Manager**

**Energy/fuel manager**: the entity that provides charging and energy management services including monitoring state of charge, scheduling vehicle charging needs and managing load. Where applicable, this may also include sending and receiving grid signals and providing vehicle-to-everything (V2X) energy flows. Note that some chargers' hardware providers include energy management software as part of their package

| ENERGY MANAGER | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | ▪ Absorb larger share of any potential revenues from electricity/environmental markets (e.g., V2G revenues), where opportunities exist<br>▪ Investment in workforce and skills development<br>▪ Integrate vehicle with other facility or site energy management activities such as rooftop solar or peak shaving | ▪ Some learning lag as staff adjust to new technology<br>▪ Operating costs may have some variability |
| **3rd party** | ▪ Reduce cost variability for district by selling at a fixed fee and absorbing any unanticipated price deviations<br>▪ Specialized expertise and technology know-how | ▪ May be asked to forgo potential revenue opportunities from electricity markets (e.g., V2G payments)<br>▪ May lock-in particular technology or lose data if switch providers later |
| **Remember that...** | *Many districts, especially underserved districts, may not have staff capacity to dedicate themselves to energy management tasks* | |

TABLE 7 | **Electricity Customer**

**Electricity customer**: the entity that pays for electricity consumed by the chargers; note that electricity service will be provided by the utility, but contractual arrangements may assign electricity costs to an entity other than the account holder, depending upon the business model pursued.

| ELECTRICITY CUSTOMER | BENEFITS TO DISTRICT *MAY* INCLUDE | CONSIDERATIONS FOR DISTRICT *MAY* INCLUDE |
|---|---|---|
| **School District** | • Realize larger share of fuel savings generated by ESBs<br>• Combine with renewables - onsite or via a Power Purchase Agreement (PPA)<br>• Potential revenue from electricity/environmental markets (e.g., V2G revenues) where opportunities exist | • May be some learning lag as staff adjust to new technology<br>• Operating costs may have some variability |
| **3rd party** | • Reduce cost variability for district<br>• Combine with renewables (onsite or PPA) | • May be asked to forgo potential revenue opportunities from electricity markets (e.g., V2G payments)<br>• Staff may not grow their capacity & skills in energy management<br>• Potential extended commitment via long-term contract |
| **Remember that...** | *Underserved districts may not have flexibility in operating budgets to accommodate monthly/seasonal variability in electricity prices* | |

These tables are not comprehensive but are indicative of the kinds of considerations districts should weigh as they begin their school bus electrification journeys and navigate the business models available to them along the way.

# Questions to guide business model discussions

- What are your community's and district's values? What are your intended outcomes for electrification?
- How can your business model advance these values and goals to promote an equitable process and outcome during electrification?
- How much capital does your district have access to? This may entail applying for grants, rebates, vouchers, etc.
- Can you access private capital to leverage this public capital, and what is the cost to do so? How might these capital sources address district capacity and staffing needs?
- Will your district be able to financially sustain the investments over the long-term through appropriations for the costs of maintenance, service fees or other operational costs?
- How much financial or technology risk (& potential for upside) is your organization comfortable with?
- What impact will each model have on your existing workforce? For each model you are considering, how will you:
  - Prevent job loss/disruption or wage decreases for incumbent employees,
  - Promote recruitment and retention, and
  - Ensure that workers have the training they need to drive, maintain, and/or repair ESBs?
- What is your workforce's capacity?
  - To manage vehicle and infrastructure procurement, deployment, maintenance and operations?
- How are procurement decisions made?
  - Various stakeholders (e.g. financiers, utilities) will need to be engaged. Some, like building and energy managers, may be new to transportation decisions.
  - Different risks and benefits will resonate with different decisionmakers in the procurement process.
- Are there potential mechanisms through which buses in your area could generate revenues, such as electricity markets, utility programs, or environmental credits?

# Electric School Bus Business Models in Action

To bring this to life, here are examples of distinct business model arrangements that five school districts have undertaken in their processes to electrify their buses:

- Stockton Unified School District (SUSD) in California – For SUSD, bus procurement, bus ownership, bus maintenance and operation, as well as the electricity costs are the responsibility of the school district. The district has contracted out charger ownership and maintenance and energy management to a **Charging-as-a-Service** company (The Mobility House).

| STOCKTON UNIFIED SCHOOL DISTRICT IN CA | | | | | |
|---|---|---|---|---|---|
| **Business Model** | Bus owner (& maintenance) | Bus operation | Charger owner (& Maintenance) | Energy manager (software) | Electricity Customer |
| **Charging-as-a-Service** | SD | SD | **3rd party** | **3rd party** | SD |

- Select schools in Lasalle, Quebec (under Lester-B.-Pearson School Board) – For schools in Lasalle that contract with Transco, a First Student subsidiary, all roles in the business model are the responsibility of the 3rd party, a **Transportation-as-a-Service approach.**

| LASALLE SCHOOLS (UNDER LESTER-B.-PEARSON SCHOOL BOARD) IN QUEBEC | | | | | |
|---|---|---|---|---|---|
| **Business Model** | Bus owner (& maintenance) | Bus operation | Charger owner (& Maintenance) | Energy manager (software) | Electricity Customer |
| **Transportation-as-a-Service** | **3rd party** | **3rd party** | **3rd party** | **3rd party** | **3rd party** |

- Fairfax County Public Schools (FCPS) in Virginia – For FCPS, bus ownership, bus maintenance, bus operation and electricity costs are the responsibility of the school district or County. A third party, the local utility (Dominion Energy), covered bus procurement, battery ownership, charger infrastructure, charger ownership, charger maintenance and energy management. Battery ownership allows the utility to utilize V2G technology if they wish. This model can be described as **Battery + Charging-as-a-Service.** Other school districts and utilities are following suit, such as Cherokee Central Schools (CCS) and Duke Energy in North Carolina.

| FAIRFAX COUNTY PUBLIC SCHOOLS IN VA | | | | | |
|---|---|---|---|---|---|
| **Business Model** | Bus owner (& maintenance) | Bus operation | Charger owner (& Maintenance) | Energy manager (software) | Electricity Customer |
| **Battery + Charging-as-a-Service** | SD for bus<br>**3rd party** for battery | SD | **3rd party** | **3rd party** | SD |

- Troy Community Consolidated School District (TCCSD) in Illinois and Beverly Public Schools (BPS) in Massachusetts – TCCSD and BPS determined that **turnkey asset management** was the model that best fit their districts. Their third-party contractors, Levo Mobility and Highland Electric Fleets, respectively, are responsible for all roles except bus operation.

| TROY COMMUNITY CONSOLIDATED SCHOOL DISTRICT IN MI AND MONTGOMERY COUNTY PUBLIC SCHOOLS IN MD | | | | | |
|---|---|---|---|---|---|
| **Business Model** | Bus owner (& maintenance) | Bus operation | Charger owner (& Maintenance) | Energy manager (software) | Electricity Customer |
| **Turnkey Asset Management** | **3rd party** | SD | **3rd party** | **3rd party** | **3rd party** |

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