Electric School Bus Webinar

Neil Taylor
Blue Bird Corporation

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Blue Bird
The Alternative Power Experts

OVER

30,000

ALT POWER SCHOOL BUSES

POWERED BY PROPANE

POWERED BY GASOLINE

OVER

3000

SCHOOL DISTRICTS

POWERED BY CNG

POWERED BY ELECTRICITY

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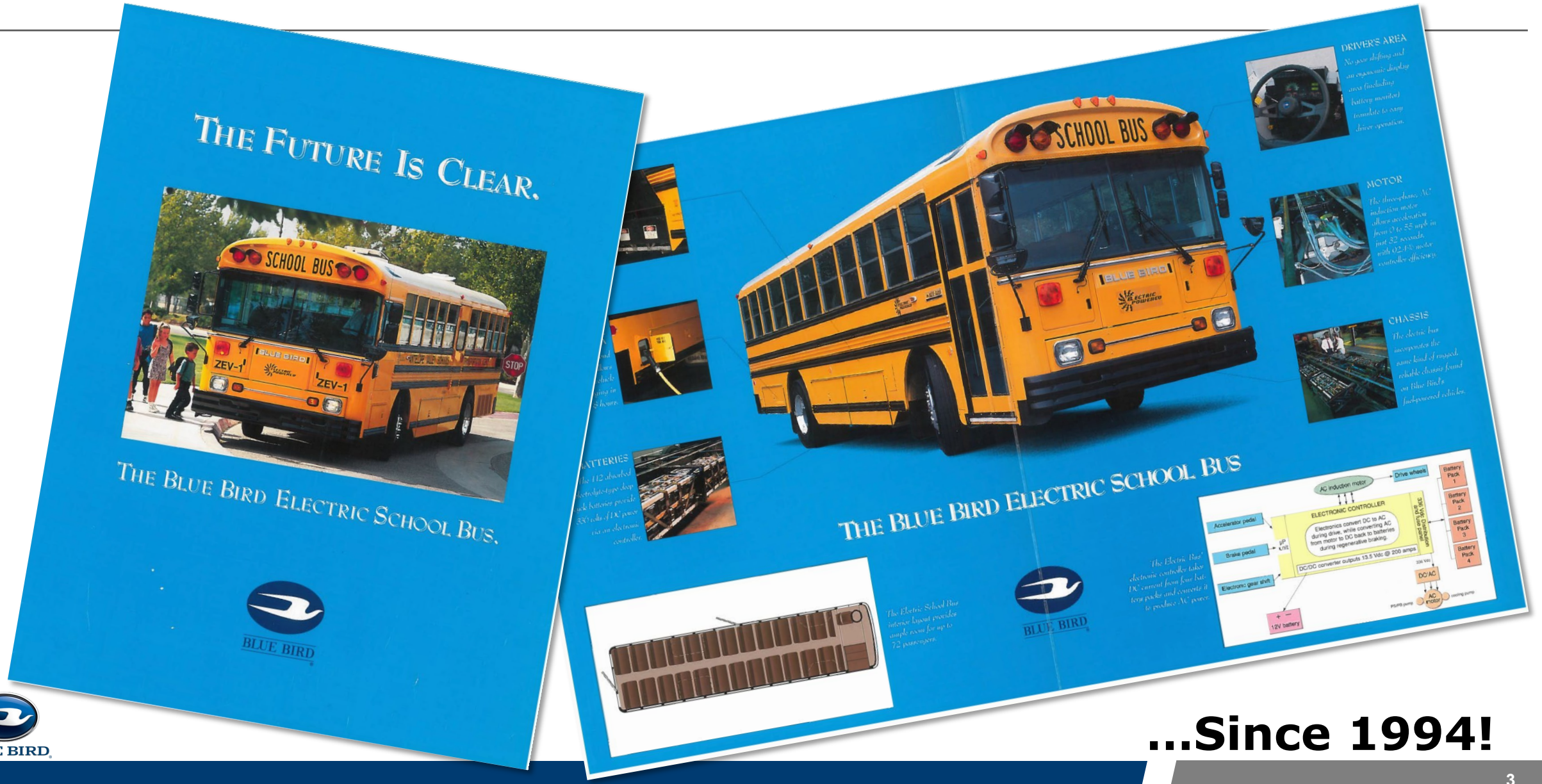
Blue Bird – First to Market with EV



...Since 1994!

Blue Bird Energy Services Ecosystem

END OF LIFE

Determine recycling program for used batteries after use

SERVICE & SUPPORT

Connect with local dealer and PowerDrive service provider to service bus throughout its lifetime

TELEMATICS

Set up a solution to track bus performance, diagnostics and more

DEPLOYMENT

Build and deliver buses, as well as offer driver, safety and technician training services

ASSESSMENT

Determine what bus best fits the customer's needs based on terrain, climate and route planning

FINANCING

Identify financing through grants, tax breaks, subsidies or lending services

INFRASTRUCTURE

Assess infrastructure needs and connect to the right partners for energy sourcing and infrastructure installation

V2G/V2X

Create vehicle-to-grid plan with payback potential and utility involvement

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Electric Recharged

- **2016**
  - Received a $4.9MM grant from US Department of Energy (US DOE) for development and commercialization of high power V2G school buses.
- **2017**
  - Launched current iteration of the Blue Bird electric bus at the STN Expo in Reno, NV
- **2018**
  - Delivered first electric-powered school buses to customers in California
- **2022**
  - Only manufacturer to produce and deploy electric school buses in Type A, Type C, and Type D
  - Standard CCS1 connector to allow both Level 2 and Level 3 charging
  - V2G capability standard on all of our Electric Buses
  - **1000 EV sales in 26 states and 4 Canadian Provinces!**

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Safety is NOT an Option

Safety – Protecting What is Most Important

Blue Bird feels it is essential that our buses are constructed to meet the Colorado Rack test standards, insuring safe exit in the event of a rollover crash. **All Blue Bird buses are Kentucky Pole tested and designed to keep all passengers safe by providing structural integrity to minimize outside intrusion**.

Crash Testing

- Blue Bird is certified to the Canadian Motor Vehicle Safety Standard CMVSS 301.1 testing protocol, higher than US
- 4,000 lbs. @ 30 MPH

Colorado Rack Test and the Kentucky Pole Test—are engineered specification requirements at Blue Bird.

- Colorado Rack Test: Ensures that the structural integrity of the bus remains intact in the event of a rollover accident
- Kentucky Pole Test: Ensures the strength of the school bus roof in case of a pole, or another sharp object impacts the bus during a rollover

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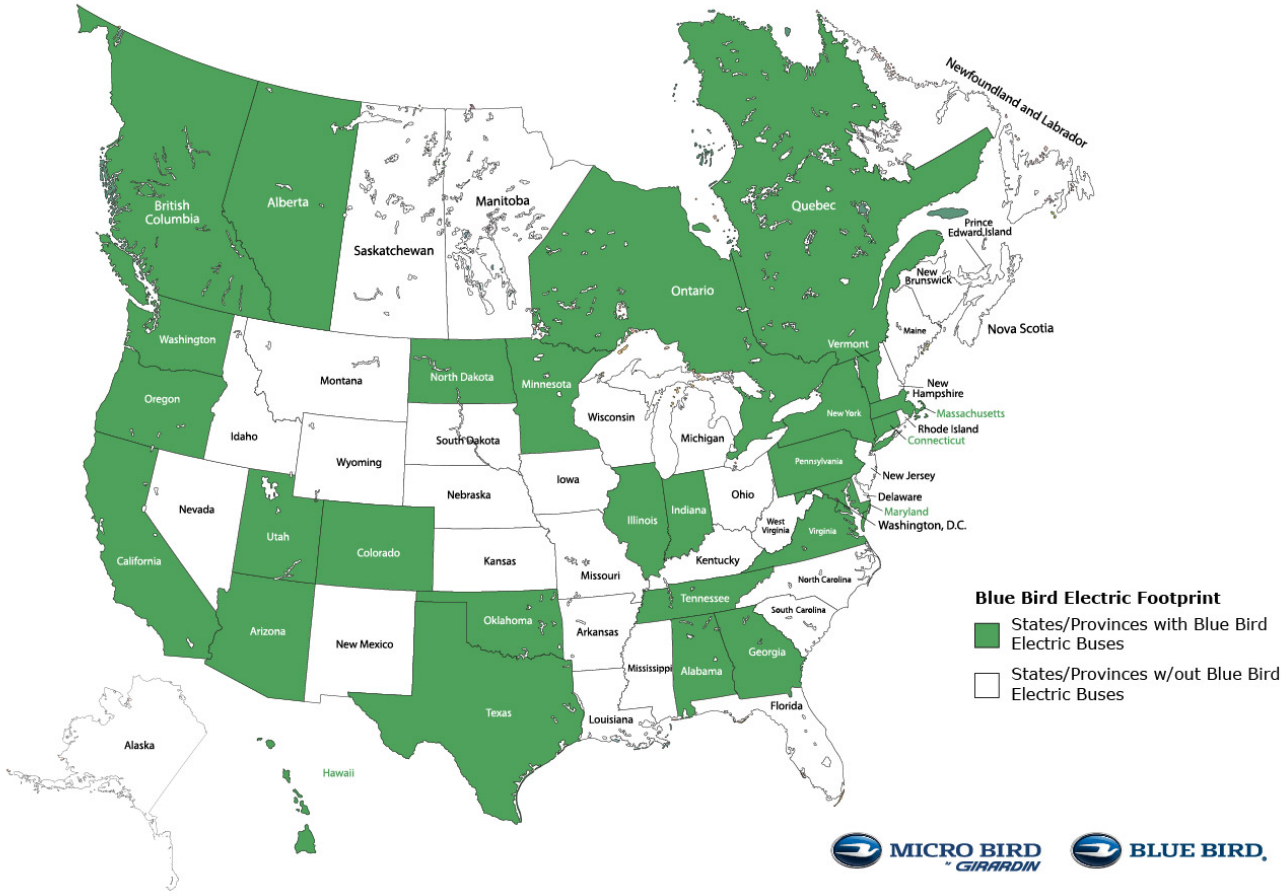
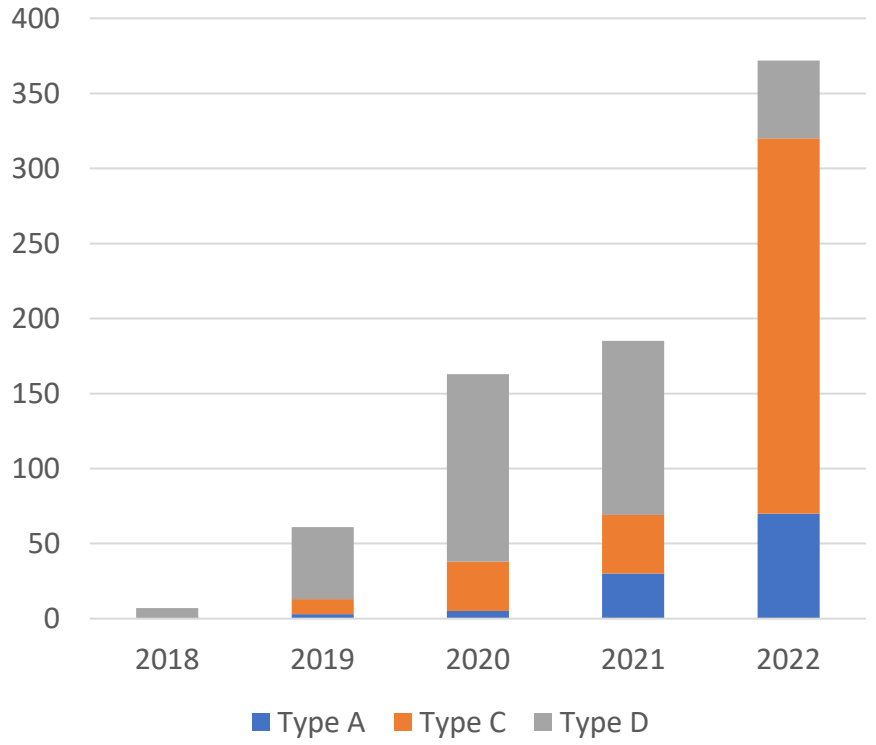
EV Deployments and Growth





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EV Options

Most options available on any Blue Bird Vision are available on our EV Vision including:

- Front and rear air ride suspension (273” wb)
- Roof or skirt mounted a/c
- Wheelchair lifts
- Luggage/tool compartments
- Heaters (front/rear locations, stepwell)

New options available:

- Electronic Stability Control – standard
- New Thermal Management System - standard
  - Provides a 3rd electric heater to allow 1 heater to be dedicated to battery heat and 2 for cabin heat
  - Allows for pre-heating of the cabin while bus is charging
- Battery insulation – optional
  - Insulation on all sides of the battery packs as well as the coolant manifolds
  - Helps to maintain optimal battery temperatures and improve efficiency
- Fuel-fired heater – optional on Type C
  - Auxiliary heating for cold-weather climates to improve cabin heat
  - Can be programmed for pre-heating of cabin

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Standard Charging:
Level 2 (AC) or Level 3 (DC Fast Charge)

- **Connector** - The plug is a Combined Charging System Level 1 (CCS1). Combines a J1772 plug (used for Level 2 AC charging) with two extra pins for Level 3 DC Fast Charging

- **Power Required for AC Charging** - For maximum 19.2kW charge rate, each EVSE must be supplied with single phase, 240v, 80 amp ac current with a 100 amp fuse. If only a 50 amp circuit breaker is available, the bus will charge at a rate up to 12 kW/hour. A bus will fully charge with AC charging from 0-100% in about 8 hours.

- **Power Required for DC Charging** - For maximum 60kW charge rate, each station must be supplied with three phase, 480VAC, 80 amp. A bus will fully charge with DC Fast Charging from 0-100% in about 3 hours. This is required for V2G.

- **Charger Costs** –
  - Level 2 charger Cost – Approximately $2,000- $5,000, for the hardware without installation.
  - DC Fast Charging systems are more expensive: $20,000 - $60,000 for hardware not including installation.

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Thank You!

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