INDIANA CLEAN SCHOOL BUS CONSORTIUM WEBINAR

December 5, 2023
10 a.m. CST

Agenda

- Welcome & Housekeeping (Drive Clean Indiana)
- Drive Clean Indiana
- Highland Electric
- BorgWarner
- U.S. EPA Update
- Q&A

About Drive Clean Indiana

Drive Clean Indiana, headquartered in St. John, Indiana, is a 501(c)(3) nonprofit organization managed by Legacy Environmental Services, Inc., an Indiana Certified Women's Business Enterprise.

Designated as the 71st Clean Cities coalition on June 15, 1999, DCI is one of the U.S. DOE's more than 75 Clean Cities coalitions across the country.

Highland

Indiana Clean School Bus Consortium

December 2023

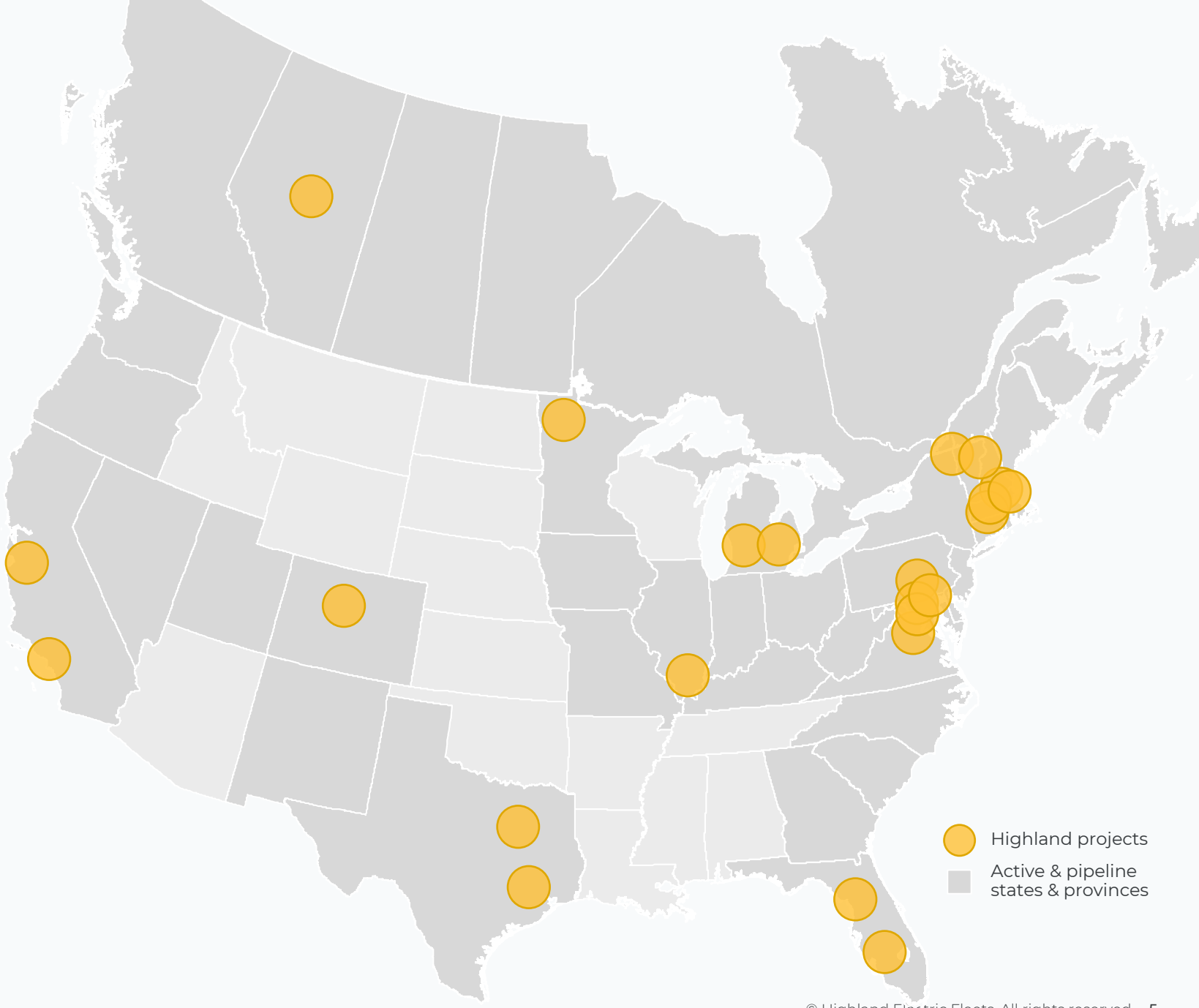
Broad fleet electrification experience

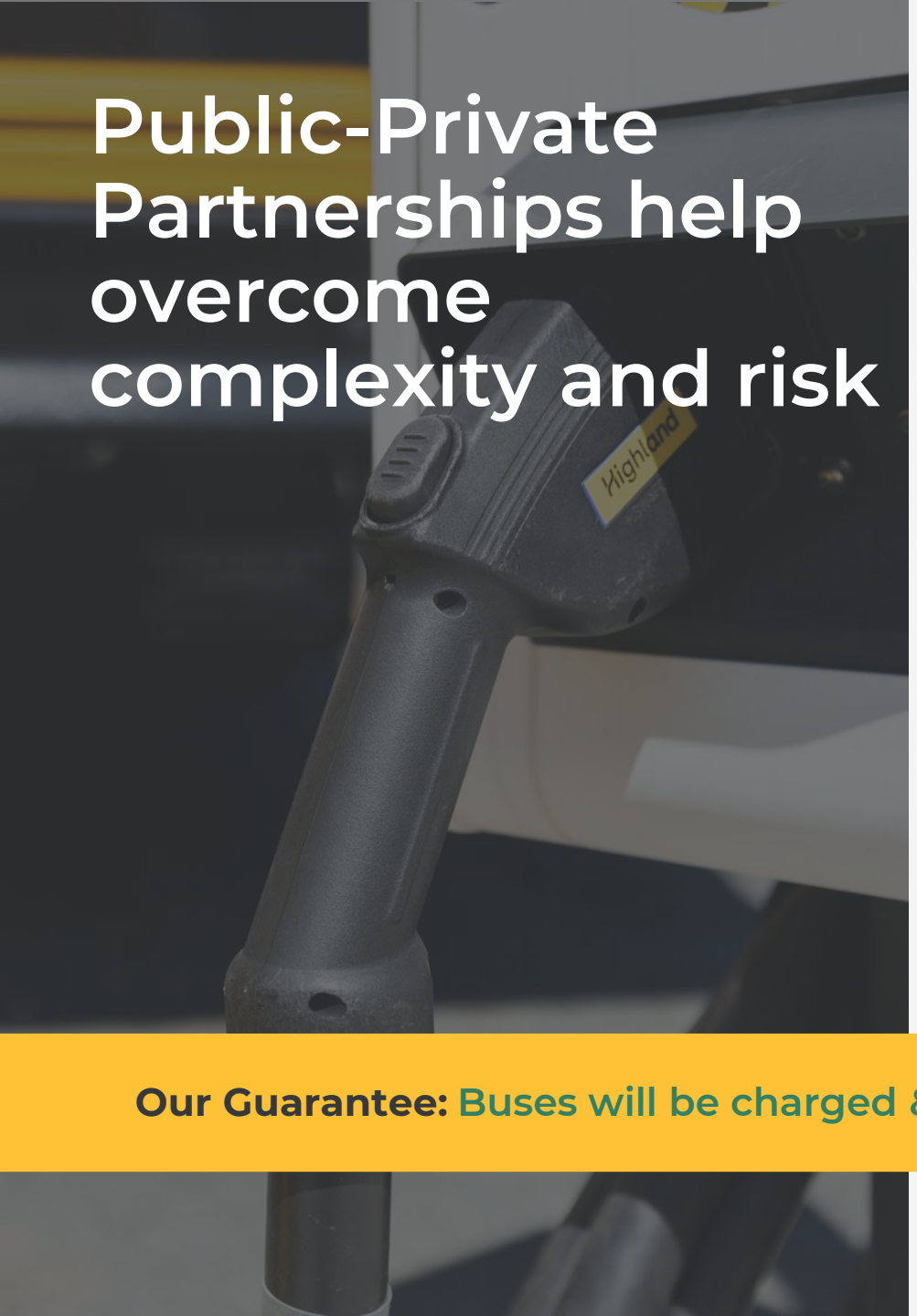
1MM+ ELECTRIC MILES DRIVEN

500+ ELECTRIC SCHOOL BUSES UNDER CONTRACT

20+ SCHOOL DISTRICT PARTNERS

5+ PROJECTS IN RURAL OR UNDERSERVED COMMUNITIES





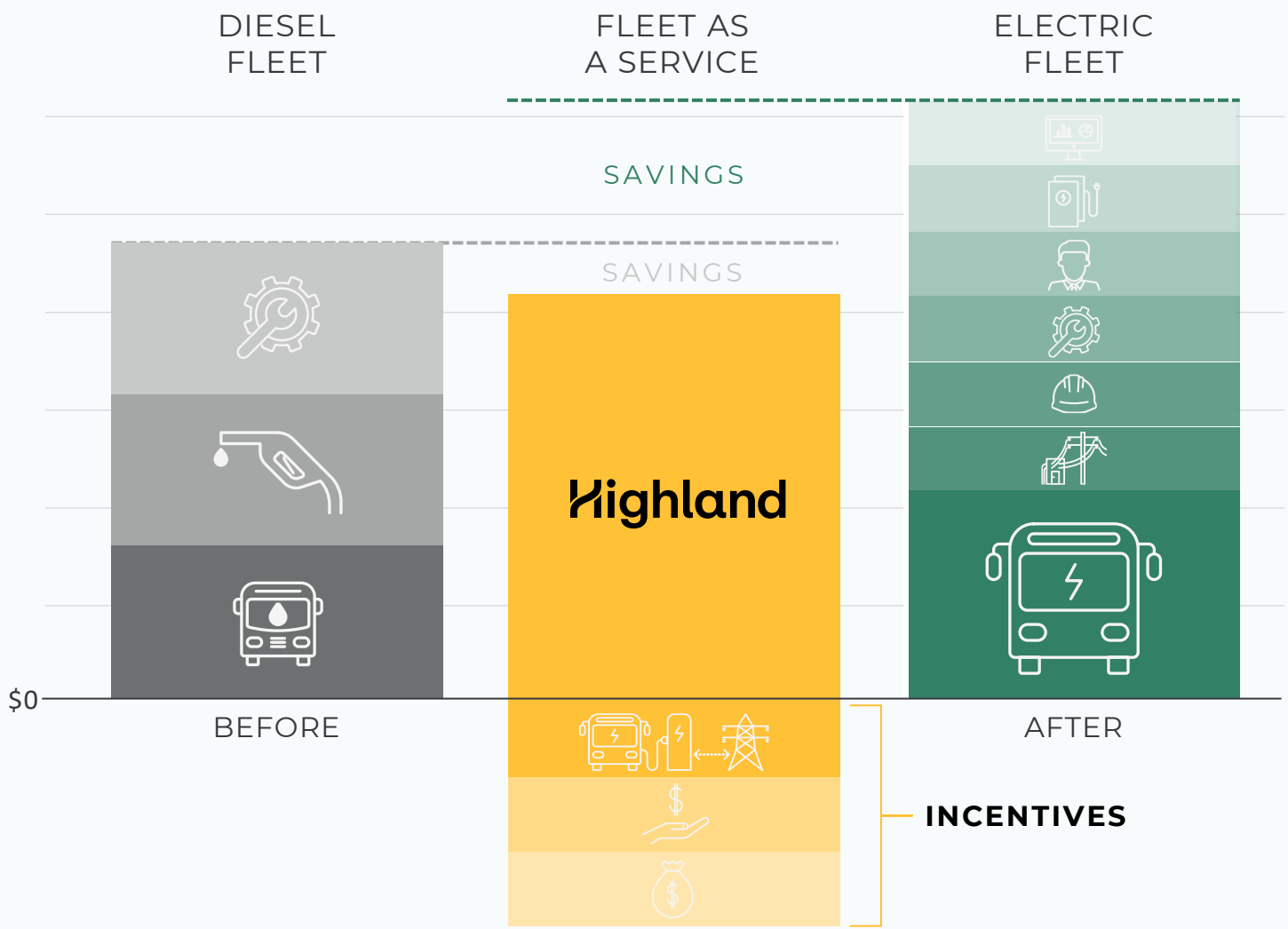
Public-Private Partnerships help overcome complexity and risk

WITH A HIGHLAND PARTNERSHIP:

1	**Plan**	We design & implement the entire project.
2	**Budget**	We apply for grants & create a budget that encompasses all aspects of your electric fleet.
3	**Build**	We procure school buses & infrastructure & manage the construction of depot upgrades.
4	**Train**	We train your drivers & mechanics to operate & maintain your new fleet.
5	**Charge**	We charge the school buses during off-peak hours and ensure you're ready for all routes.
6	**Maintain**	We reimburse for all repair costs, including parts and labor.

Our Guarantee: Buses will be charged & route-ready every school day – if not, we pay for the downtime

Highland's model enables cost effective electrification



Highland makes it affordable.

- No Upfront Cost / No Bond Funds
- Turn-Key Solution
- Save Year 1
- Lower Total Program Cost
- Monetize Tax Incentives
- Aligned Partnership
- Operations & Maintenance Included
- Performance Guarantee

Lessons From EPA Rebate Round 1

- Check your SAM.gov registration
- Collect details on your current fleet and prepare supporting documentation
- Engage your utility to discuss infrastructure needs
- Consider creative methods for procurement, sourcing & implementation
- Plan for future deployments and technologies

V2G at scale with Highland

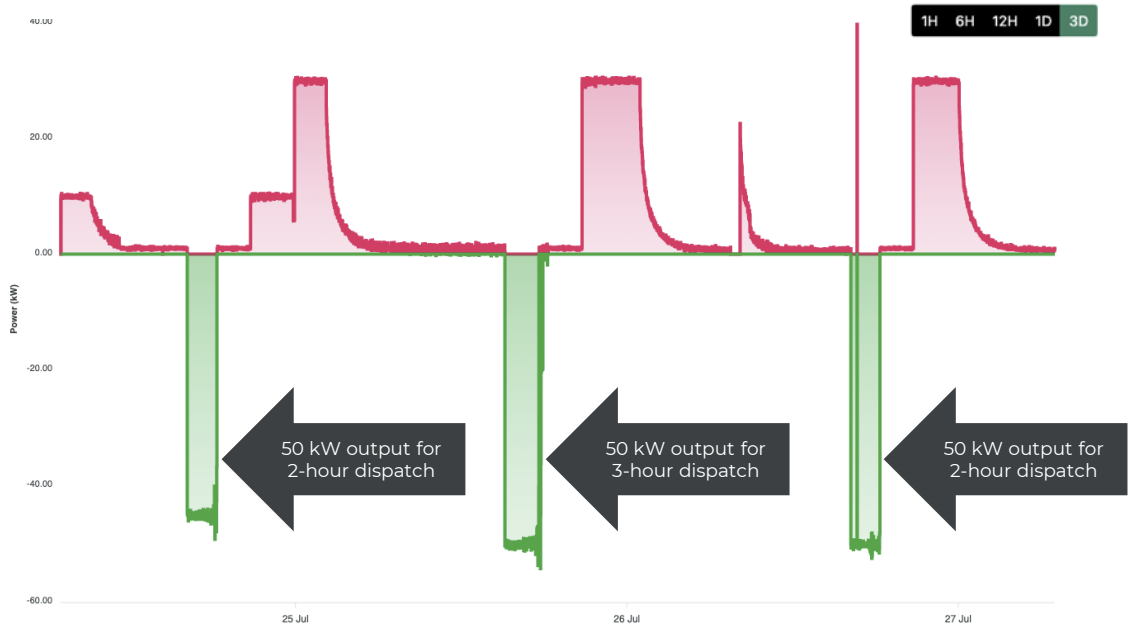
120 kW / 360 kWh
V2G PROJECT IN MASSACHUSETTS

240 kW / 720 kWh
V2G PROJECT IN VERMONT

REAL RESULTS

In the summers of 2021 and 2022, Highland orchestrated a commercial V2G program with National Grid in Massachusetts, that sent **10.8 MWh** back to the grid over **158 hours**.

Single Bus V2G Performance Summer 2022 – Massachusetts[1]



1. Snapshot from Highland's energy management software system, developed in coordination with partner Synop. Output not a guarantee of future performance.

Thank You

Joshua Williams

Joshua@highlandfleets.com

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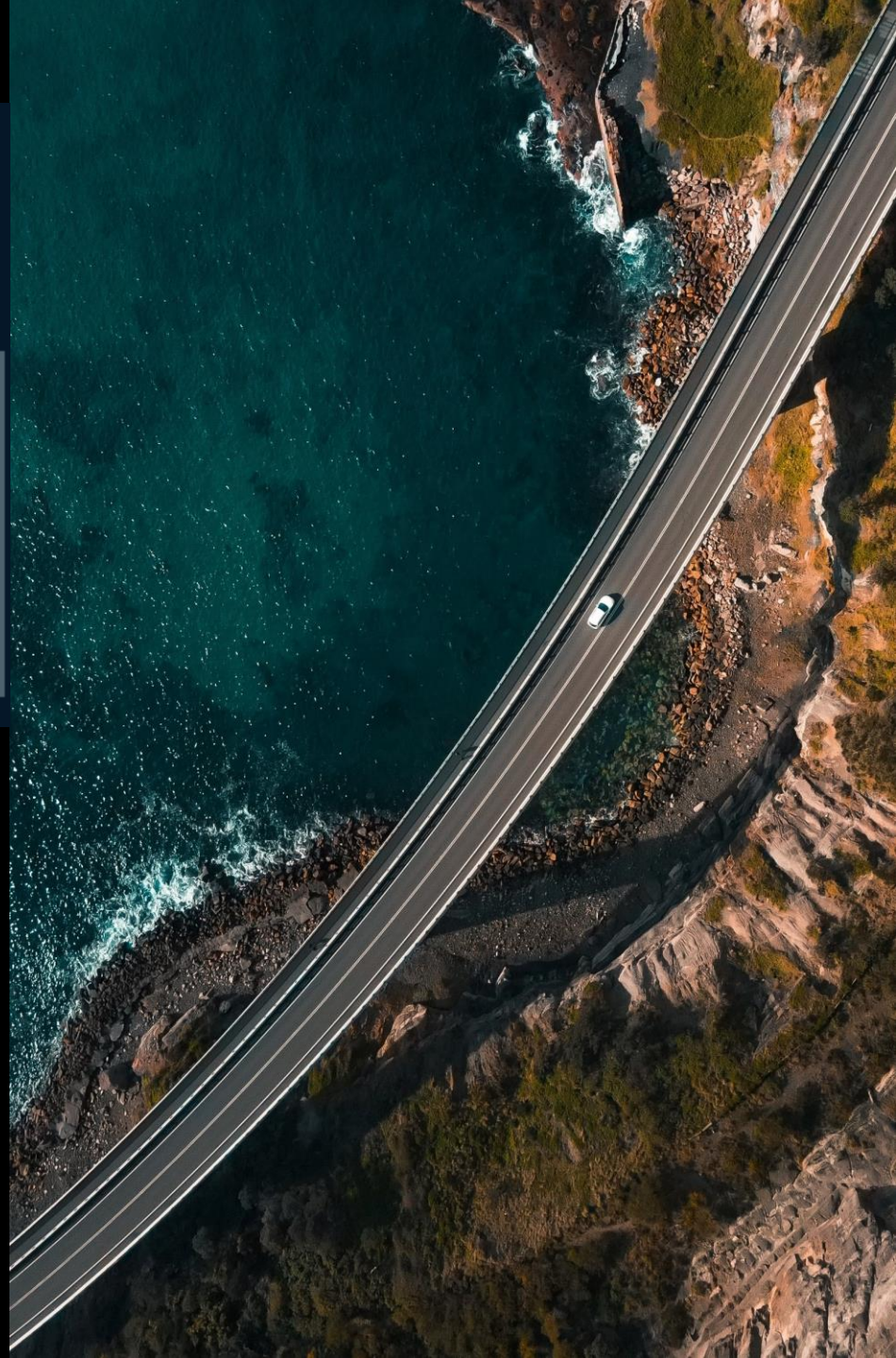
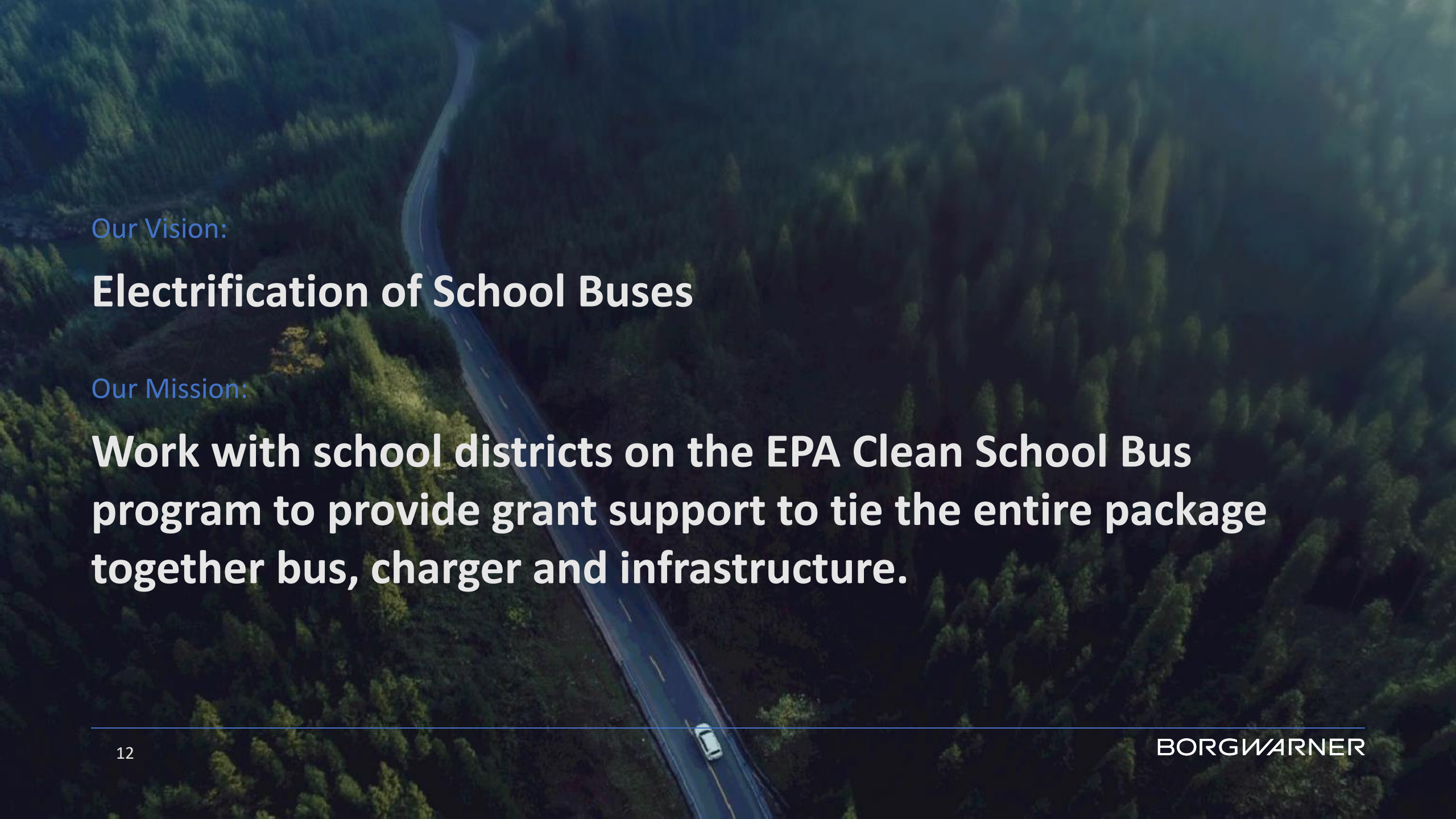
CHARGING FORWARD

EVSE Overview

August 2023





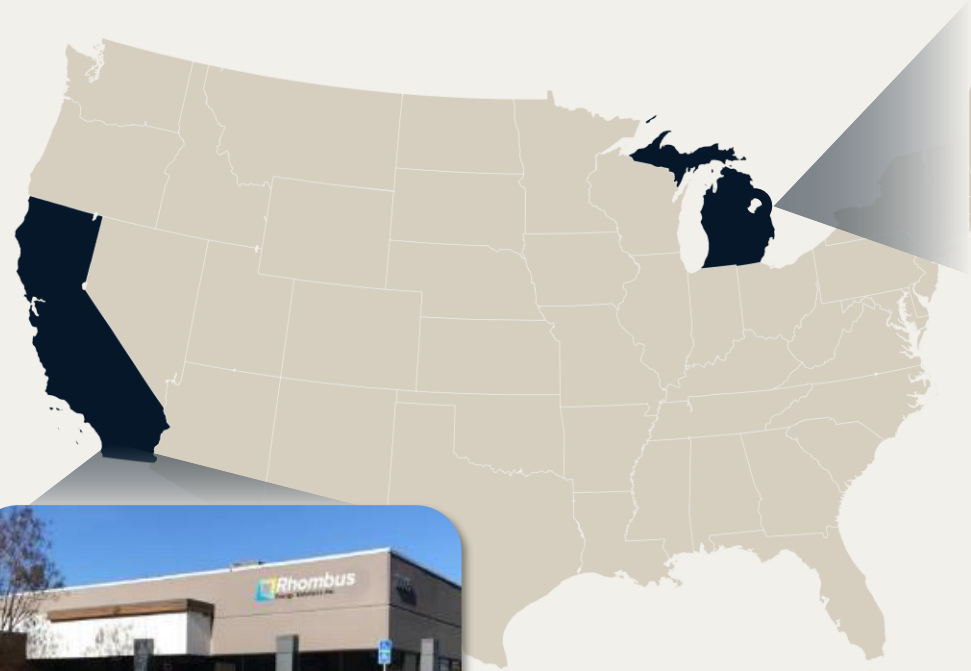
Our Vision:

Electrification of School Buses

Our Mission:

Work with school districts on the EPA Clean School Bus program to provide grant support to tie the entire package together bus, charger and infrastructure.

High-Power USA Manufacturing Capabilities



Dearborn, MI

- In-house manufacturing and engineering facility
- Service and support
- UL-certified, high-power lab

San Diego, CA – Rhombus HQ

- R&D engineering center

Ahmedabad, India - Rhomboid

- Dedicated subcontractor relationship for engineering services

3,000

DCFC units capacity per annum

6,000

DCFC units additional expansion capacity

70,000

Square feet of in-house manufacturing, test, service, and distribution space

Fully in-house manufacturing, UL-certified testing facilities and warehouse

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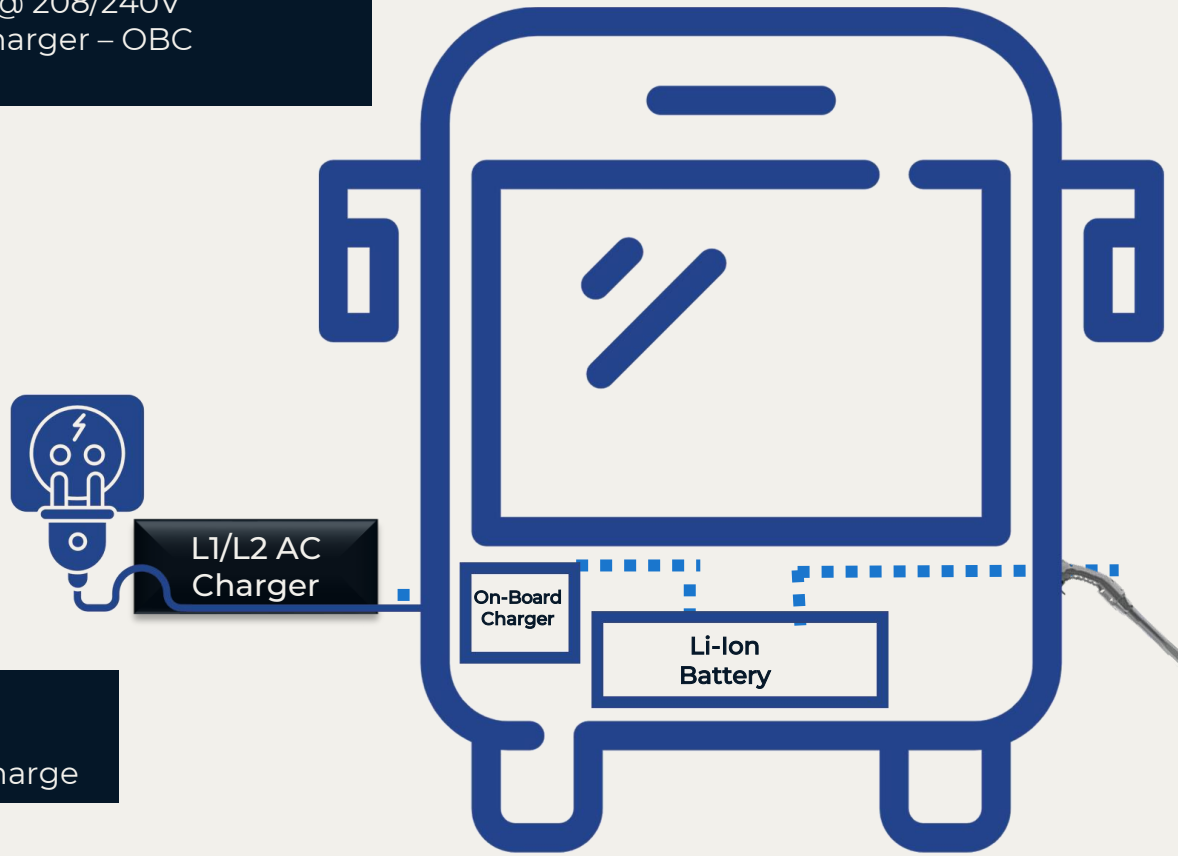
AC Vs DC Charging

AC

- AC – Alternating current
- Level 1: 1.44-1.92 (kW) @ 120V, 12-16 A
- Level 2: up to 19.2kW @ 208/240V
- Requires on-board Charger – OBC
- J1772-2017

DC

- DC- Direct Current
- 480V 3
- Charge delivered directly to battery
- CCS1 combo Connector
- J1772-2017



DCFC

Slow charging
Currently, Unidirectional
Up to 100 hours for full charge

Fast charging
Flexible
Smart
Monetizable
Resilience applications
Unidirectional/Bidirectional
As low as 1 hour

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Sequential Charging

Sequential Charging

- Enables charging vehicles one a time
- Target application – fleets such as School bus, Vocational trucks for those with defined duty cycles and depot times
- Charges EV battery to max state of charge then sequentially charges next EV in line

60kW or 125kW
In production

Up to 5 Dispenser for a single power cabinet

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BorgWarner Partners with the School District of the City of Pontiac to Offer Industry-First Charging System for Buses

$20,000 in EPA funding per port

- Infrastructure developed utilizes Environmental Protection Act (EPA) Clean School Bus Program funding
- Sequential charging maximize EPA per-port funding - $20k per port ~ $500,000 total for EVSE
- V2G-ready
- 60kW & 125kW chargers
- Supporting IC Bus Electric CE Series School Buses
- **Utilize sequential charging across 3 depots to enable free DC charging with school bus fleet**

SCHOOL DISTRICT OF THE CITY OF PONTIAC

Examples of Sequential Charging times for Buses 60kW

State of Charge Remaining	80%	70%	60%	50%	40%	30%	20%	10%
Battery 226 Kw Remaining	180.8	158.2	135.6	113	90.4	67.8	45.2	22.6
Used Kw in transit	45.2	67.8	90.4	113	135.6	158.2	180.8	203.4
60 Kw/hr charge time 1 bus	0.8	1.1	1.5	1.9	2.3	2.6	3.0	3.4
Charge time per bus	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours
Bus 1	0.8	1.1	1.5	1.9	2.3	2.6	3.0	3.4
Bus 2	1.5	2.3	3.0	3.8	4.5	5.3	6.0	6.8
Bus 3	2.3	3.4	4.5	5.7	6.8	7.9	9.0	10.2
Bus 4	3.0	4.5	6.0	7.5	9.0	10.5	12.1	13.6
Bus 5	3.8	5.7	7.5	9.4	11.3	13.2	15.1	17.0

V2G Bidirectional Charging

Electricity from EV battery sent back to grid for peak shaving

2009 The V2G Journey Begins

Willett Kempton
College of Earth, Ocean, and Environment,
Special Initiative on Offshore Wind (SIOW),
and
Center for Research on Wind (CReW)
University of Delaware

Auto Port INC.

ELSEVIER
Journal of Power Sources
Volume 144, Issue 1, 1 June 2005, Pages 280-294

Vehicle-to-grid power implementation: From stabilizing the grid to supporting large-scale renewable energy

Author links open overlay panel Willett Kempton Jasna Tomić
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https://doi.org/10.1016/j.jpowsour.2004.12.022Get rights and content

Abstract

Vehicle-to-grid power (V2G) uses electric-drive vehicles (battery, fuel cell, or hybrid) to provide power for specific electric markets. This article examines the systems and processes needed to tap energy in vehicles and implement V2G. It quantitatively compares today's light vehicle fleet with the electric power system. The vehicle fleet has 20 times the power capacity, less than one-tenth the utilization, and one-tenth the capital cost per prime mover kW. Conversely, utility generators have 10–50 times longer operating life and lower operating costs per kWh. To tap V2G is to synergistically use these complementary strengths and to reconcile the complementary needs of the driver and grid manager. This article suggests strategies and business models for doing so, and the steps necessary for the implementation of V2G. After the initial high-value, V2G markets saturate and production costs drop, V2G can provide storage for renewable energy generation. Our calculations suggest that V2G could stabilize large-scale (one-half of US electricity) wind power with 3% of the fleet dedicated to regulation for wind, plus 8–38% of the fleet providing operating reserves

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2012 V2G Demonstration Project

law to codify interconnects

Section 2. Amend §1014, Title 26 of the Delaware Code by adding a new subsection to read as follows:

(g) A retail electric customer having on its premises one or more grid-integrated electric vehicles shall be credited in kilowatt-hours (kWh) for energy discharged to the grid from the vehicle's battery at the same kWh rate that customer pays to charge the battery from the grid, as defined in (e)(1) of this section. For electric customers with time of use rates, the kWh rate for charging and discharging shall be the rate in effect when charging or discharging occurs. Excess kWh credits shall be handled in the same manner as net metering as described in (e)(1) of this section. To qualify under this subsection, the grid-integrated electric vehicle must meet the requirements in (d)(1)a., (d)(1)b. and (d)(4) of this section. Connection and metering of grid integrated vehicles shall be subject to the rules and regulations found in (e)(2), (e)(3), and (e)(4) of this section.

Net metering for V2G

Net is at rate at time of use

Interconnection requirements, etc same as distributed renewables

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What is the V2G Platform Technology

Driver / Fleet Manager

Schedule

Software Aggregation Platform

Charge/Discharge signal

DC Electricity

CSS plug

AC Electricity

AC Electricity

Building

Grid

V2G Charging Station (Bi-directional inverter)

NUVVE

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DC Fast Charging Solutions

1741SA
Industry First /
Only High Power
Bidirectional DCFC

MADE IN THE U. S. A.

Leaders in High Power Electronics for the EV Industry

- Rhombus **founded in 2012** and acquired by **BorgWarner** in 2022
- **UL-certified bi-directional** and **charge only** high-power DC Fast Chargers
- Industry best standard **5-year warranty** and optional **10-year warranty** available
- Only DC Fast Charger company that is **vertically integrated** – design, certification, manufacture, warehouse and service
- Industry best lead times – **4 to 8 weeks** (1)
- Nearly 1,500 systems deployed worldwide
- First DCFC to qualify for the National Electric Vehicle Infrastructure (**NEVI**) Formula (2)

High Power Direct Current Fast Charging

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Note:
(1) Volumes < 5 units, higher volumes based on forecast
(2) $5 billion to states over five years to establish EV charging stations every 50 miles along the interstate highway system or within one mile of an interstate exit. All 50 states, along with the District of Columbia and Puerto Rico, submitted plans

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EPA CLEAN SCHOOL BUS

2023 Clean School Bus Rebate Program

2023 CSB Rebate Program Overview

EPA is offering at least **$500 million** for clean school buses and ZE school buses. EPA may modify this amount based on the applicant pool and other pertinent factors. Funds are subject to availability and total awards may be higher or lower than the anticipated funds offered update if changed.

Eligible activities include the **replacement of existing internal-combustion engine (ICE) school buses with electric, propane, or compressed natural gas (CNG) school buses**, as well as the purchase and installation of **electric vehicle supply equipment (EVSE) infrastructure.**

EPA is prioritizing applications that will replace buses serving **high-need local education agencies, Tribal school districts funded by the Bureau of Indian Affairs or those receiving basic support payments for students living on Tribal land, and rural areas.** EPA is committed to ensuring the CSB Program delivers on the Justice40 Initiative.

EPA

Application packages must be submitted to EPA no later than 1/31/24 at 4:00 p.m. ET.
For more information, please visit *www.epa.gov/cleanschoolbus.*

EPA CLEAN SCHOOL BUS

Prioritization Criteria

2023 CSB Rebates*

Please note that program criteria may be different from prior CSB funding opportunities and are subject to change in future rounds of CSB funding

Applications due Jan. 31, 2023.
www.epa.gov/cleanschoolbus

MAJOR PROGRAM CHANGE:

60% of Funds -> Priority Applicants

40% of Funds -> Non-Priority Applicants

EPA

EPA CLEAN SCHOOL BUS

CSB Funding per Replacement Bus

School District Prioritization Status	Replacement Bus Fuel Type and Size					
	ZE – Class 7+*	ZE – Class 3-6*	CNG– Class 7+	CNG – Class 3-6	Propane – Class 7+	Propane – Class 3-6
Buses serving school districts that meet one or more prioritization criteria	Up to $345,000 (Bus + Charging Infrastructure)	Up to $265,000 (Bus + Charging Infrastructure)	Up to $45,000	Up to $30,000	Up to $35,000	Up to $30,000
Buses serving school districts that are not prioritized	Up to $200,000 (Bus + Charging Infrastructure)	Up to $145,000 (Bus + Charging Infrastructure)	Up to $30,000	Up to $20,000	Up to $25,000	Up to $20,000

**Funding levels include combined bus and EV charging infrastructure. Recipients have flexibility to determine the split between funding for the bus itself and the supporting infrastructure.*

ADA-Compliant Buses: Applicants can request up to an **additional $20k** to purchase ADA-compliant clean school buses of any fuel type equipped with wheelchair lifts.

High Shipping Costs: Applicants in non-contiguous U.S. states and territories will receive up to an **additional $20k** per bus to cover high bus shipping costs.

Tax Credits: Selectees may be eligible for IRA tax credits applicable to their bus and infrastructure purchase(s) not reflected in the funding table.

Application packages must be submitted to EPA no later than 1/31/24 at 4:00 p.m. ET.
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IRS Tax Credits

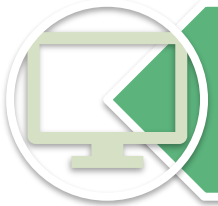
- Selectees may be **eligible for Inflation Reduction Act (IRA) tax credits applicable to their bus and infrastructure purchases**, mainly the:
  - **Commercial Clean Vehicle Credit**, which provides up to $40,000 for qualified commercial clean vehicles; and the
  - **Alternative Fuel Vehicle Refueling Property Credit**, which provides up to $100,000 for qualified charging and refueling infrastructure.

EPA cannot give tax advice. Refer to guidance on the IRS website for further instruction.

- Selectees may also be eligible to claim all or a portion of the value of IRA credits using either the new elective pay, and transferability mechanisms introduced by the IRS.
- See the Internal Revenue Service (IRS) website for more information on these credits.
- **Please review the IRS' guidance linked above for more information about your eligibility for this credit, as well as when you may be able to receive the credit.**

Next Steps – *How to Apply*

1. Visit the Clean School Bus Website for Tools & Resources



2. Register your Organization with SAM.gov

3. Complete your Application Form and Supplemental Applicant Forms

4. Submit Application Package by **January 31st, 2024 at 4:00pm ET**

EPA

Application packages must be submitted to EPA no later than 1/31/24 at 4:00 p.m. ET.
For more information, please visit *www.epa.gov/cleanschoolbus.*

EPA CLEAN SCHOOL BUS

Important Dates

September 27, 2023	**2023 Rebate Program Opens**
September 2023 – January 2024	**Various Webinars on CSB Program** *More information can be found on the epa.gov/cleanschoolbus website under the 'Webinars' section.*
January 10, 2024 by 4:00 pm (ET)	**Final Date to Submit Questions**
January 31, 2024 by 4:00 pm (ET)	**Application Deadline**
April 2024	**Anticipated Notification of Selection**
April 2024 – October 2024	**Selectees submit Payment Request Forms with purchase orders**
April 2026	**Project Period Deadline**

EPA

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EPA CLEAN SCHOOL BUS

Upcoming Webinars

October 4, 2023	Panel Discussion: 2022 Rebate Selectees with Q&A
October 12, 2023	JOET: Technical Assistance Overview & Utility Planning with Q&A
October 17, 2023	Panel Discussion: Selectee and Utility with Q&A
November 2, 2023	JOET: Fleet Planning & Route Analysis with Q&A
November 14, 2023	Panel Discussion: Transportation Directors with Q&A
December 13, 2023	OIG: Fraud Prevention & Best Practices with Q&A
January 10, 2024	Popular Q&A with Extended Q&A Session
January 24, 2024	CSB Outreach: Topic TBD
February 7, 2024	2023 Rebates Feedback and Next Steps

**Please note: Webinar topics are subject to change. To view the most up-to-date list of CSB webinars and register, please visit: www.epa.gov/cleanschoolbus/events-related-clean-school-bus-program*

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EPA CLEAN SCHOOL BUS

Coalition Notes

- Please outreach to all school districts
  - Applications are a numbers game; better chance for IN money if there are more applications
- EPA funding for at least four in-person coalition meetings in 2024
- Send pictures of Clean School Busses and inform EPA of publicity events
  - Cranberg.Carter@epa.gov

To schedule a meeting, please contact:

Ryan Lisek, Program Manager
Drive Clean Indiana

DriveCleanIndiana.org

219-644-3690

RLisek@DriveCleanIndiana.org

10115 Ravenwood Drive, Suite B
St John, IN 46375

Become a member of Drive Clean Indiana

What Our Clients Say

Being a member of Drive Clean Indiana has been increasingly beneficial thanks to their efforts to promote and educate its members and the public about federal, state and even local incentives for investing in alternative fuel systems. Drive Clean Indiana also helps connect businesses and government entities to the CNG & alternative fuel marketplace, providing support for challenges faced along the way.

Tim Ozinga, Ozinga Ready Mix Concrete

Scan the QR Code with your phone or visit
www.drivecleanindiana.org/apply-online/

QUESTIONS?

Drive Clean Indiana

DRIVE CLEAN INDIANA

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219-644-3690

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10115 Ravenwood Drive, Suite B
St John, IN 46375

See you next year!

Catch the next Indiana Clean School Bus Consortium Meeting:

January 9, 2024