Funding and Financing Electrification

Midwest Mountain Electric School Bus Working Group

May 10, 2023 | 1:00 PM CT

WORKING GROUP AGENDA

MAY 10, 2023

- Intro to Electric School Bus Network
- Guest Speaker Introduction: Highland Electric
  - Matt Stanberry
- Summary + Closing

CALSTART

ELECTRIC SCHOOL BUS NETWORK

MEET THE TEAM

Rachel Chard
National Program Manager

Katelyn Tomaszewski
Project Manager

Juan Espinoza
Project Manager

Liza Walsh
Associate Project Manager

Ian Fried
Lead Project Manager

CALSTART

ELECTRIC SCHOOL BUS NETWORK

ESB NETWORK

The Electric School Bus Network accelerates nationwide school bus fleet electrification through **peer-to-peer networking** and **dialogue-driven working group meetings** for school districts, advocacy organizations, government organizations, and industry representatives. The ESB Network provides access to educational tools, resources, and subject matter experts to **help support the electric school bus fleet transition.**

In Partnership With:

WORLD RESOURCES INSTITUTE

CALIFORNIA HVIP

CALSTART

ELECTRIC SCHOOL BUS NETWORK

Questions for speaker?

Please raise your hand or type your questions for our panelists in the chat!

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ELECTRIC SCHOOL BUS NETWORK

Funding and Financing for ESBs

Matt Stanberry

Vice President

Highland Electric

Funding and Financing

DESCRIPTION

The vast majority of the 480,000 school buses in the U.S. are diesel. These buses are noisy, emit toxins harmful to children, bus drivers, and communities, and are expensive to fuel and maintain. Electric school buses are better for student health and academic achievement, provide a better "office" environment for bus drivers, and are less expensive to fuel and maintain -- but they have been prohibitively expensive and complex to implement. That is changing: today, districts can upgrade to electric school bus fleets for less than what they pay to purchase, fuel, and maintain their diesel buses. Highland Electric Fleets VP of Market Development, Matt Stanberry will draw from their experiences to explain what’s involved in electrification and explain key elements of funding and financing an electrification project.

Highland

2023 CALSTART Midwest/Mountain Electric School Bus Working Group

Trends affecting the transportation status quo

Rising fuel prices

New fuel economy & exhaust standards

Driver shortage

Awareness of health impacts of ICE buses

Trends accelerating electrification

EV bus costs down

Diesel costs up

Electricity is cheaper than diesel

Demand for grid reliability & resiliency up

Increasing government incentives & mandates

School bus electrification

June 2022

Market defined by small pilot projects

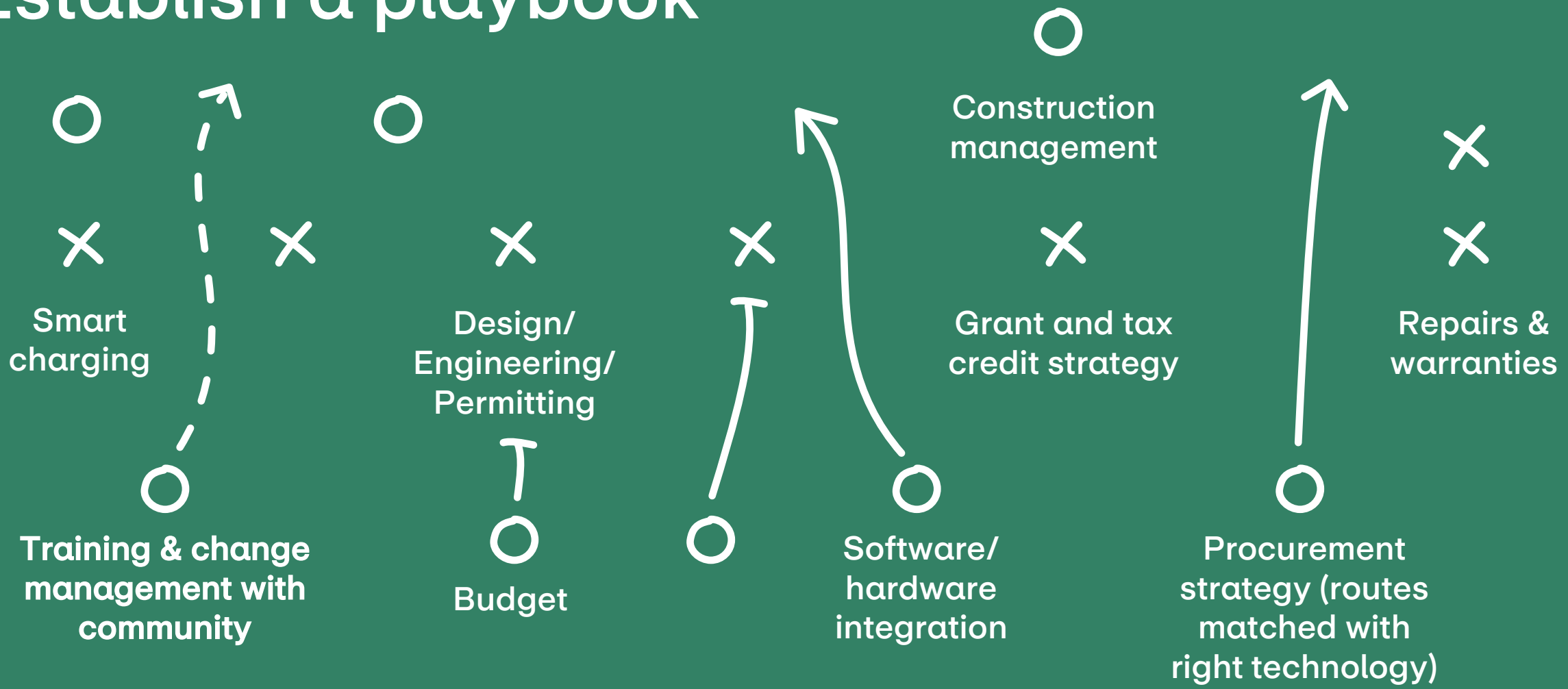
Money came from settlements, utilities or some state grants

School bus electrification

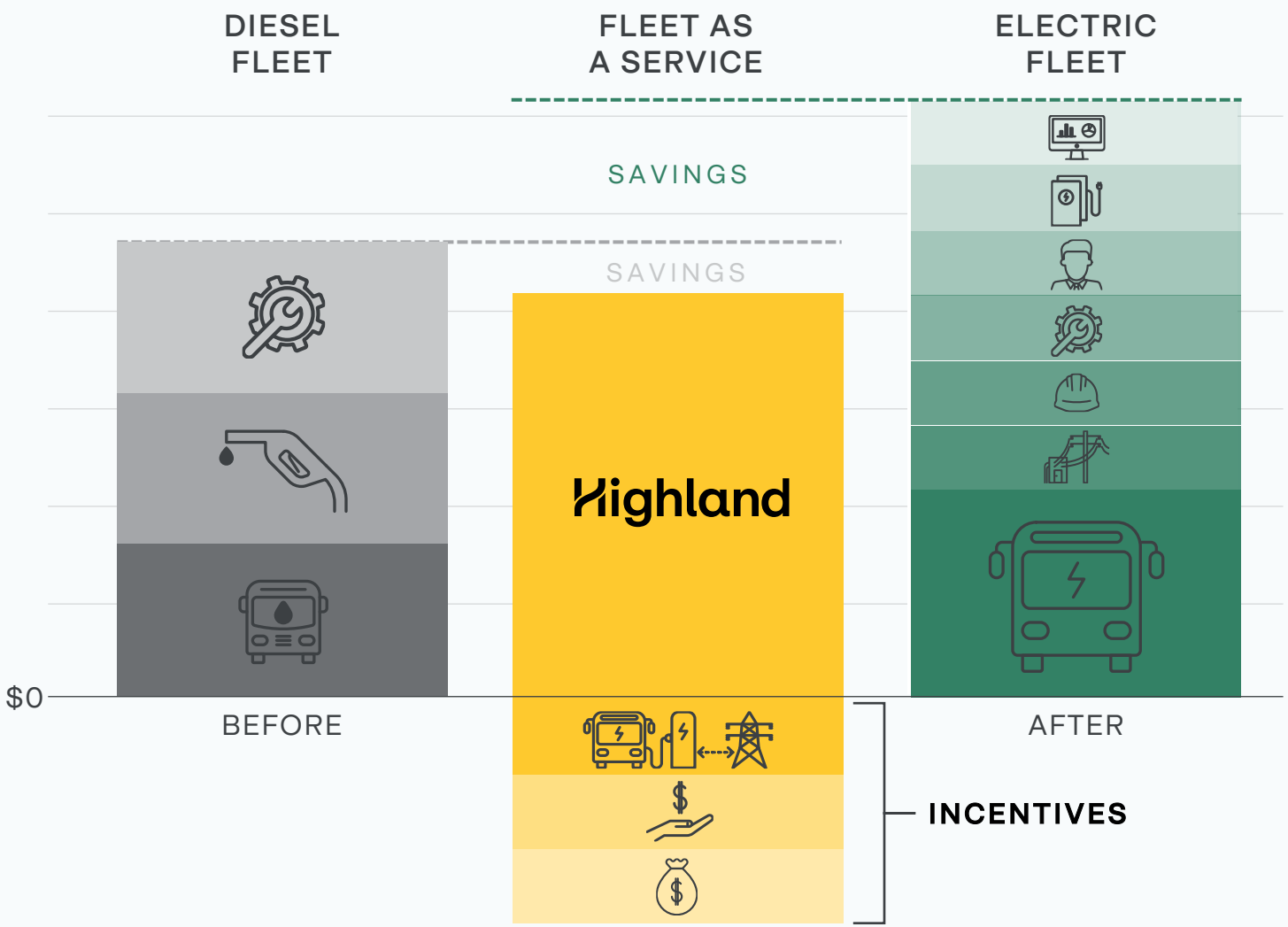
now

Decrease complexity

Establish a playbook



A better electric fleet, for less



Highland makes it affordable.

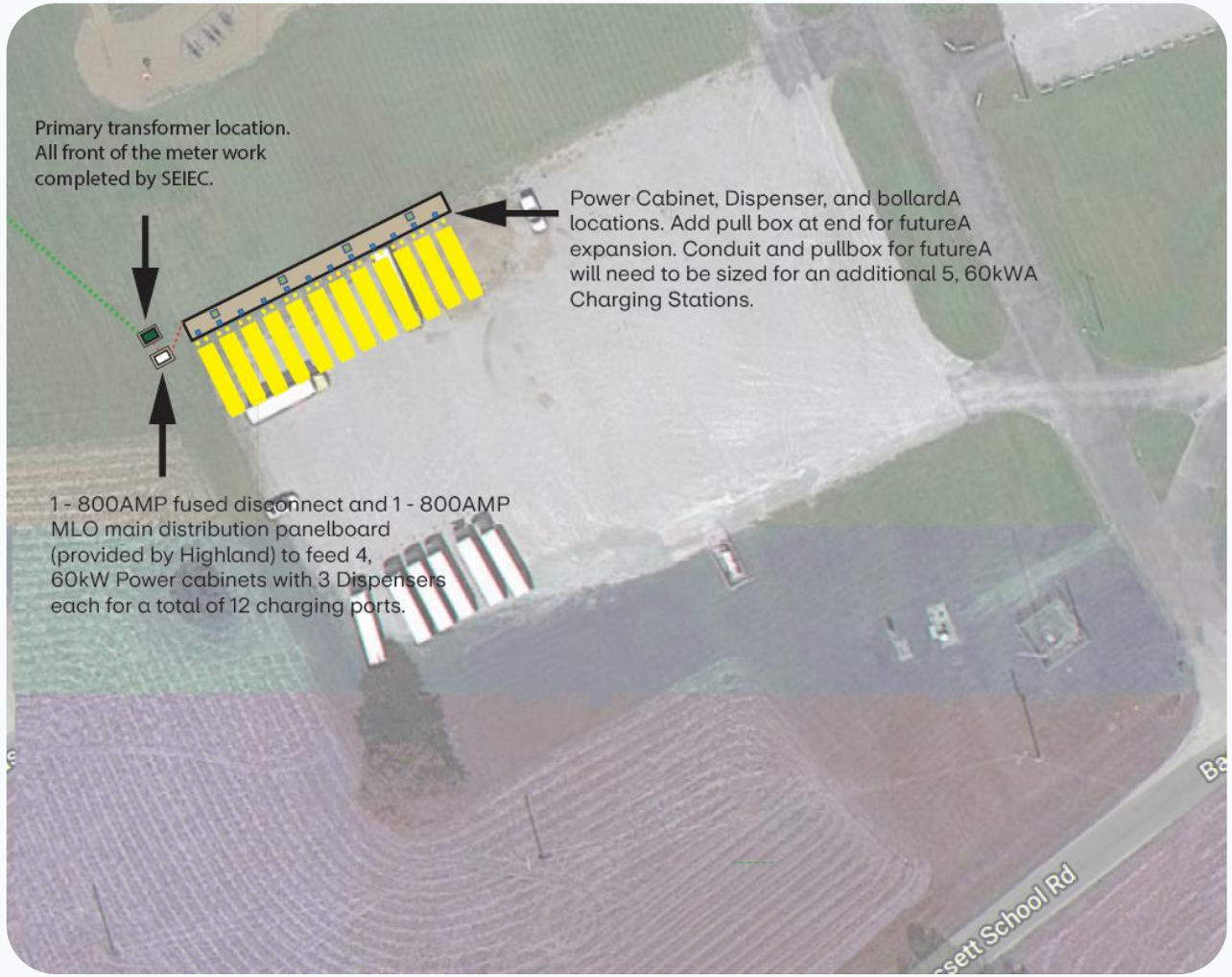
- No Upfront Cost / No Bond Funds
- Turn-Key Solution
- Save Year 1
- Lower Total Program Cost
- Monetize Tax Incentives
- Aligned Partnership
- Operations & Maintenance Included
- Performance Guarantee

Hardin County, IL

Hardin CUSD #1

- One of most economically challenged counties in IL
- 182 square miles
- 92% of students ride buses to/from school
- Buses travel an average 160k miles/year
- Transportation costs $642k/year (12% of budget)
- Converting 80% of fleet to electric over the next two years

Hardin electric school bus site plan



VEHICLES

Deploy 12 Type C Blue Bird Buses

CHARGING INFRASTRUCTURE

Four 60kW chargers with three dispensers: 3:1 Bus to Charger ratio

UTILITY INFRASTRUCTURE

Two 800AMP panels: Infrastructure is sized for an additional five 60kW chargers

Reduce costs

Applying an old idea to a new resource

Energy Savings Contracts

- Provider funds equipment, district pays for performance.
- People are now applying this model to electric school buses.

- 3:1 Charger Ratio (60kW) reduces overall equipment and construction costs
- Overnight depot charging provides lowest electricity cost profile
- V2G capable for year-round participation
- Lifetime savings of $1.5M

Highland Partnership Profile				Current ICE Bus Service		Real Savings
Year	Electric Buses	Price Per Bus	Total Cash Payment	Current Bus Cost (per bus)	Payment (Current)	Total Savings
1	6	$ 20,750	$ 124,500	$ 27,000	$ 162,000	$ 37,500
2	12	$ 20,958	$ 251,490	$ 27,810	$ 333,720	$ 82,230
3	12	$ 21,167	$ 254,005	$ 28,644	$ 343,732	$ 89,727
4	12	$ 21,379	$ 256,545	$ 29,504	$ 354,044	$ 97,499
5	12	$ 21,593	$ 259,110	$ 30,389	$ 364,665	$ 105,554
6	12	$ 21,808	$ 261,702	$ 31,300	$ 375,605	$ 113,903
7	12	$ 22,027	$ 264,319	$ 32,239	$ 386,873	$ 122,554
8	12	$ 22,247	$ 266,962	$ 33,207	$ 398,479	$ 131,517
9	12	$ 22,469	$ 269,631	$ 34,203	$ 410,434	$ 140,802
10	12	$ 22,694	$ 272,328	$ 35,229	$ 422,747	$ 150,419
11	12	$ 22,921	$ 275,051	$ 36,286	$ 435,429	$ 160,378
12	12	$ 23,150	$ 277,801	$ 37,374	$ 448,492	$ 170,690
13	6	$ 23,382	$ 140,290	$ 38,496	$ 230,973	$ 90,684
Total	12		**$ 3,173,733**		**$ 4,667,191**	**$ 1,493,458**

Get grants

Apply at the federal- and state-level

STATE

- Utility Make-Ready, V2G pilots, EVSE rebates
- State Incentives (CO CDPHE, IL EPA, OH EPA)

FEDERAL

- Inflation Reduction Act tax credit
- EPA Clean School Bus Program

EPA Clean School Bus Program

FY22-FY26

Authorized through the Bipartisan Infrastructure Law

$5 Billion over 5 years

To replace existing school buses with zero-emission and low-emission models

EPA Clean School Bus Program Round 2

$400 million to be awarded through competitive grants

- Opened: April 24, 2023
- Closes: August 22, 2023
- Selection: Nov – Jan ‘24
- Awards: Feb – Mar ‘24

Program Overview

- Award mechanism: Grants via competitive application
- Funding for vehicles: Battery-electric, CNG, propane
- Project size: Minimum of 15 buses, maximum of 50 per district
- Third-party partners: Eligible to apply on behalf of specific school districts

Implementation Requirements

- Project implementation: Within 24 months of award, starting April 2024
- Scrappage: Vehicle model year 2010 or older, diesel-powered, operational
- Infrastructure: Funding for charging infrastructure limited to in-front-of meter expenses (EV chargers, electrical panels)

Selection Criteria

- Prioritization: ”Priority” & “non-priority” districts eligible, districts can self-certify as “priority” based on specific criteria
- *See next slides for additional details*

EPA Clean School Bus Program Round 2

Round 2 applications will require significantly more effort than the Round 1 random lottery

Competitive Program Elements:

ENVIRONMENTAL JUSTICE & WORKFORCE DEVELOPMENT

Score points for meeting prioritization criteria and developing community engagement & workforce development plans

RELEVANT EXPERIENCE

Demonstrate relevant electric school bus or sustainability program experience

PROBABILITY OF SUCCESS

Show that you know what's required to implement an EV fleet & how you will address any gaps

COST SHARE

Deomstrate that you are contributing to the financing of the project through a public private partnership or other means

Questions?

Matt Stanberry
matt@highlandfleets.com

Appendix

EPA: Detailed Application Requirements & Evaluation Criteria
V2G: Highland Experience to Date & Market Opportunity

Highland track record & expertise

Highland Supported Many Districts in Round 1

ONGOING ENGAGEMENT
Policy-making and program design engagement beginning in 2020

ACTIVE PROGRAM PARTICIPATION
Submitted applications with 55 school districts

PROACTIVE PREPARATION FOR TIMELY DEPLOYMENT
Reserved 200 bus manufacturing slots for partners to ensure on-time delivery

NAVIGATING ALL PROGRAM REQUIREMENTS, SCRAPPAGE INCLUDED
Acquired replacement buses for customers that did not already have them

Highland is Ready to Help Even More in Round 2

DEEP EXPERTISE IN APPLICATION DEVELOPMENT
Leverage our extensive EPA and other incentive experience at the local, state, and federal levels

BROAD ELECTRIFICATION EXPERIENCE
Draft off of our 410+ electric school buses under contract and deployment of the largest electric school bus project in North America

TRACK RECORD OF HIGH-QUALITY PROJECTS
Lean on our high-quality and compelling project design expertise to show EPA you can deliver

KNOWLEDGE OF GRANT SCORING SYSTEMS
Use our experience to maximize the score of your application

EPA Round 2 – Application requirements

Highland's experts are here to help

Application Section		Requirement
1	Cover Page	Include information detailed on P28 of NOFO
2	Work Plan	• Project summary and approach • Expected project outputs and outcomes including expected quantitative and qualitative outcomes and outputs on the project. • Performance measures to track, measure and report on progress towards expected outcomes and outputs • Timeline and milestones for specific tasks
3	EJ and DACs	• Identify districts that meet prioritization criteria • Identify ways that project addresses engagement with affected communities and populations. Partnership letters can be included within this section.
4	Project Location	• List project locations if in Ozone or PM2.5 nonattainment or maintenance.
5	Programmatic Capability and Past Performance	• List federally funded assistance agreements in last three years and describe history of meeting reporting requirements in addition to staff expertise in being able to execute on proposed project goals.
6	Project Sustainability	• Ability to demonstrate that applicant and project partners will be able to promote and continue efforts to reduce emissions from school buses after EPA funding for project has ended.
7	Workforce Development	• Application should demonstrate plan to prepare workforce for the project.
8	Project Resilience to Climate Impacts	• Should detail extent to which project implements climate change adaptation considerations.
9	Leveraging Additional External Funds	• List and describe additional external funds that will support proposed project activities including PPP, grants from other entities, or issuance of school bonds.
10	Budget	• Narrative and detailed description of budget including approach to ensuring proper management of grant funds, detailed narrative, as well as an itemized budget table.
11	Additional Attachments	Required: Applicant fleet sheet and (if third party) documentation of third-party approval

EPA Round 2 – Evaluation criteria

Highland's experts are here to help

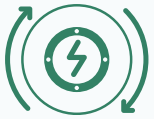
Criteria			Points (120)
1	Project Summary and Approach	Evaluate cohesiveness of applicant's project approach described throughout the application and how the overall strategy fits together to meet the goals and objectives of the CSB program.	10
2	Environmental Results – Outputs, Outcomes and Performance Measures	• **(5 points)** Extent and quality of outputs and outcomes identified and proposed. • **(5 points)** Quality of proposed performance measures and effectiveness for tracking and measuring progress • **(5 points)** Reasonableness of proposed timeline including key milestones for specific tasks and likelihood of achieving project goals by project end.	15
3	EJ and DACs	• **(20 points)** Extent to which application benefits districts that meet prioritization criteria. • **(5 points)** Extent to which project addresses engagement with these affected communities and populations including their meaningful participation in the application process.	25
4	Project Location	• If project are located in Ozone or PM2.5 nonattainment or maintenance.	5
5	Programmatic Capability and Past Performance	• **(5 points)** Past performance in successfully completing and managing a project described in Section IV.B of the announcement • **(5 points)** History of meeting the reporting requirements • **(5 points)** Organizational experience	15
6	Project Sustainability	• Extent to which project results are sustainable and can be continued after project completion.	10
7	Workforce Development	• Extent to which application has demonstrated a plan to prepare workforce for the project.	5
8	Project Resilience to Climate Impacts	• Extent to which project implements climate change adaptation considerations.	5
9	Leveraging Additional External Funds	• Extent to which project leverages external funds that will support proposed project activities including PPPs, grants from other entities, or issuance of school bonds.	15
10	Budget	• **(5 points)** Detailed breakdown by funding type in appropriate budget category • **(5 points)** Applicant approach, procedures, and controls to ensure funding will be expended in a timely and efficient manner. • **(5 Points)** Proposed Costs are reasonable and accomplish proposed goals	15

Vehicle-to-grid (V2G) with Highland

# OF BUSES	ENERGY CAPACITY	IMPACT TO COMMUNITY
25	5 MWh	116 Local Homes for 1 Day
275	58 MWh	1,400 Local Homes for 1 Day
1,100	231 MWh	5,500 Local Homes for 1 Day

Electric school buses are essentially batteries on wheels. They're ideally suited to provide capacity, stability, and emergency power to the grid.

500k electrified buses add 60GWh of storage capacity.



Highland uses V2G participation to offset the upfront cost of electric buses and make fleets more affordable.

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**.

V2G Conceptual Diagram

Provide up to **nine hours of 60kW output** with a three-bus bidirectional charging system:

600 kWh of mobile dual-use EDSI assets[1]

Three interconnected 60 kW bidirectional chargers[2]

Single 60 kW bidirectional inverter for charge / discharge[3]

Backflow energy to anywhere with a bidirectional charger: installation distribution grid, microgrid, or critical infrastructure[4]

A single 3-bus system (pictured) services a peak electric power output of 60 kW for 9 hours

40 systems (4,000-amps) will support 2.4 MW of power output for 9 hours (or 60 kW for 360 hours)

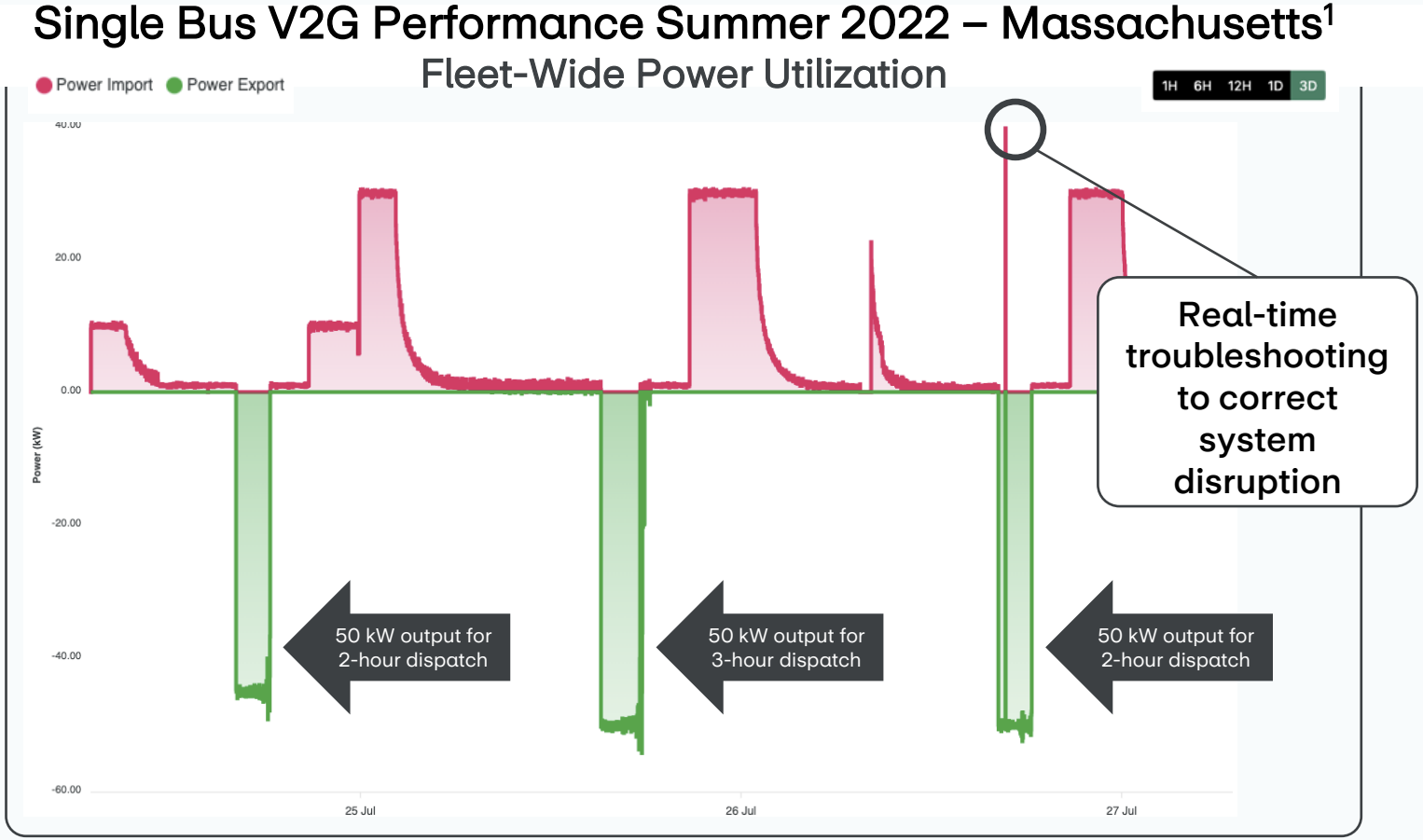
1. Based on 200kWh of usable battery capacity on Thomas Built Jouley (2022 vintage); actual capacity varies by OEM model
2. Sequential discharge format requires cycling between ports; simultaneous discharge capabilities expected in 2023
3. System capable of continuous backflow of 60 kW until bus batteries are depleted; DC-to-AC conversion results in approximately 5% line losses in Highland operating projects
4. Additional electrical panels and controls required for interconnection; dependent on localized project dynamics

V2G Operating Experience

Highland has two operating Vehicle-to-Grid projects for peak shaving

Single Bus V2G Performance Summer 2022 – Massachusetts[1]

Fleet-Wide Power Utilization



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

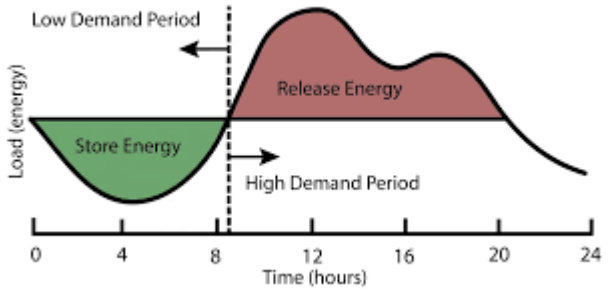
V2G Market Mechanisms: Peak Demand Reduction Incentive Programs

V2G is possible in active demand response programs today

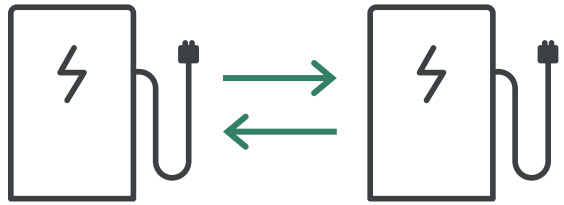
GREEN MOUNTAIN POWER

nationalgrid

Program administrators identify peak periods when stored electricity can help



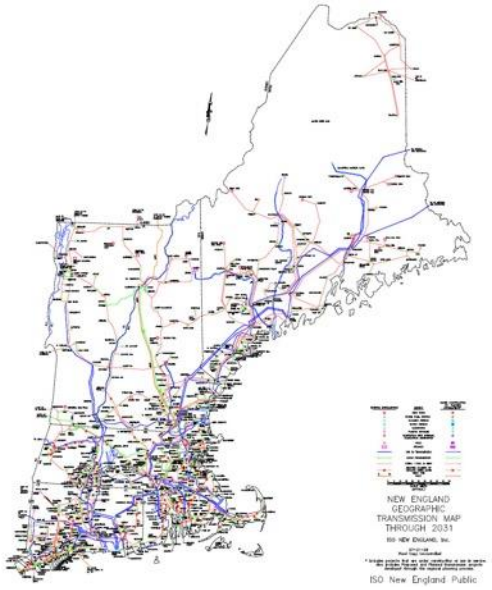
School buses respond to performance-based incentive payments



Get Paid to Discharge at Peak!

V2G Market Mechanisms: Direct Market Participation

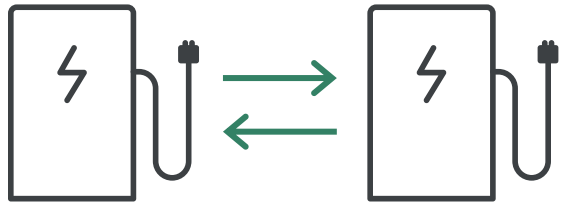
New Hampshire participates in a wholesale electricity market



NHEC manages the supply and demand of electricity for its coop members

your NEW HAMPSHIRE Electric Co-op

School Buses respond to price signals based on the dynamic costs of electricity



Buy Low, Sell High!

2023 EPA CLEAN SCHOOL BUS GRANT PROGRAM

- EPA anticipates awarding approximately $400 million in Clean School Bus funding
- Application opened on April 24, 2023 and will close on August 22, 2023 at 11:59 p.m. Eastern Time
- Eligible applicants include state and local governmental entities that provide a bus service, public school districts, eligible contractors, nonprofit school transportation associations, Indian tribes, tribal organizations, or tribally controlled schools
- **Info Session: May 10 at 3:00 pm ET/12:00 pm PT**
- https://www.epa.gov/cleanschoolbus/clean-school-bus-program-grants

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Upcoming Midwest In Person Events:

- MI Lightning Day with Lightning eMotors – Ride & Drive
  - June 7th Oakland County, Michigan
  - Reach out to ktomaszewski@calstart.org for more information
- Interested in hydrogen?
  - Reach out to lpaul@calstart.org to learn more about a transit site visit.

Wrap Up

A follow-up email will be sent on Friday 5/10 with the following:

- Recording of the meeting
- Copy of slides

Upcoming ESB Regional Working Groups

- **Route Modeling** | South/Gulf Coast meeting at 12:00 AM CT
- **Third-Party Operators** | Northeast/Mid-Atlantic meeting at 12:00 AM CT

Questions?

- Email: SchoolBusTeam@calstart.org

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THANK YOU FOR PARTICIPATING

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