Medium Heavy Duty EV Ecosystem Straw Proposal

2021 Stakeholder Meeting
Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

Monday, September 13, 2021
10:00 a.m. – 2:00 p.m.

Via webinar

Question and Answer

- Questions should be typed into the Q & A tab on your screen.
- During the Q & A period, the moderator will use those questions as the basis of discussion with the panel.
- Please keep questions specific to the presentations and the topics discussed by the specific panel.
- A separate meeting will be held on October 1 for public comment.

Comment Deadline

- All comments are due by October 5th.
- Comments on specific stakeholder presentations and topics should be submitted two weeks after the panel is held via the directions listed in the Public Notice.

Comments

- Members of the public may file written comments regardless of whether they participate in the public meetings.

- Please submit comments directly to **Docket No. QO21060946** using the “Post Comments” button on the Board’s Public Document Search tool.

- Written comments may be submitted electronically to **board.secretary@bpu.nj.gov** in PDF or Word format. Please include the subject line “MHD EV Infrastructure.” All comments must be received on or before the comment deadline of **5:00 p.m. ET on October 5, 2021.**

Brief Break

The Stakeholder Meeting will resume after a short break.

GLOBAL COMMERCIAL VEHICLE DRIVE TO ZERO

A CAMPAIGN OF THE CLEAN ENERGY MINISTERIAL

CALSTART

Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

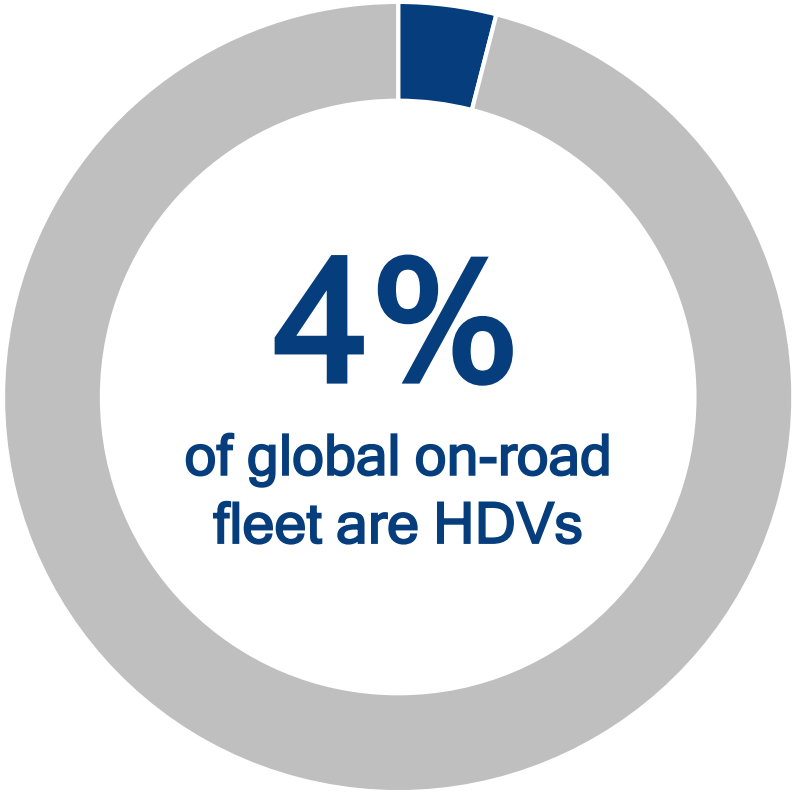
New Jersey Board of Public Utilities

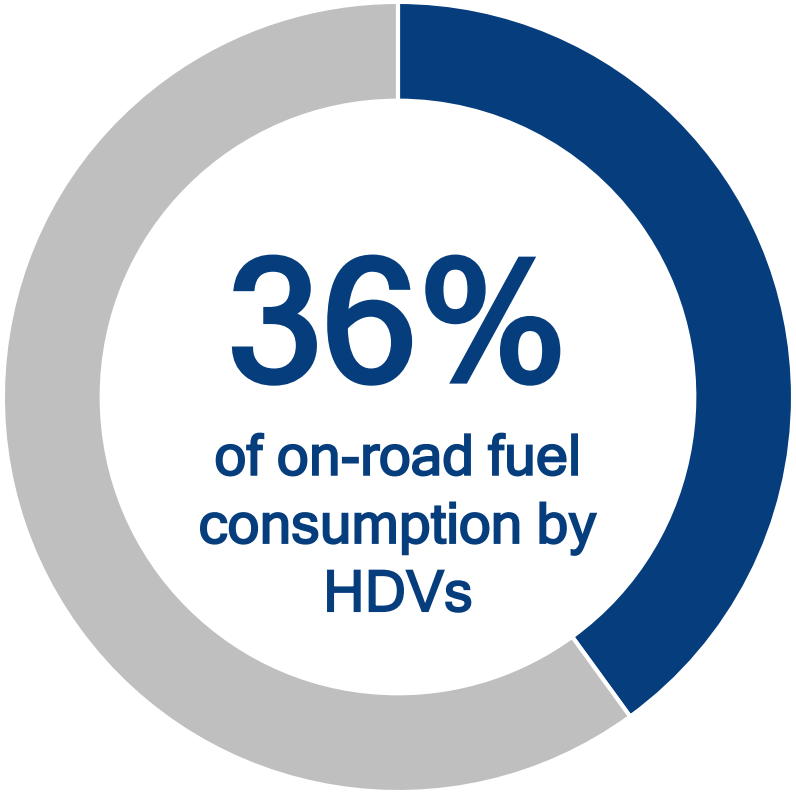
Benjamin Mandel
CALSTART

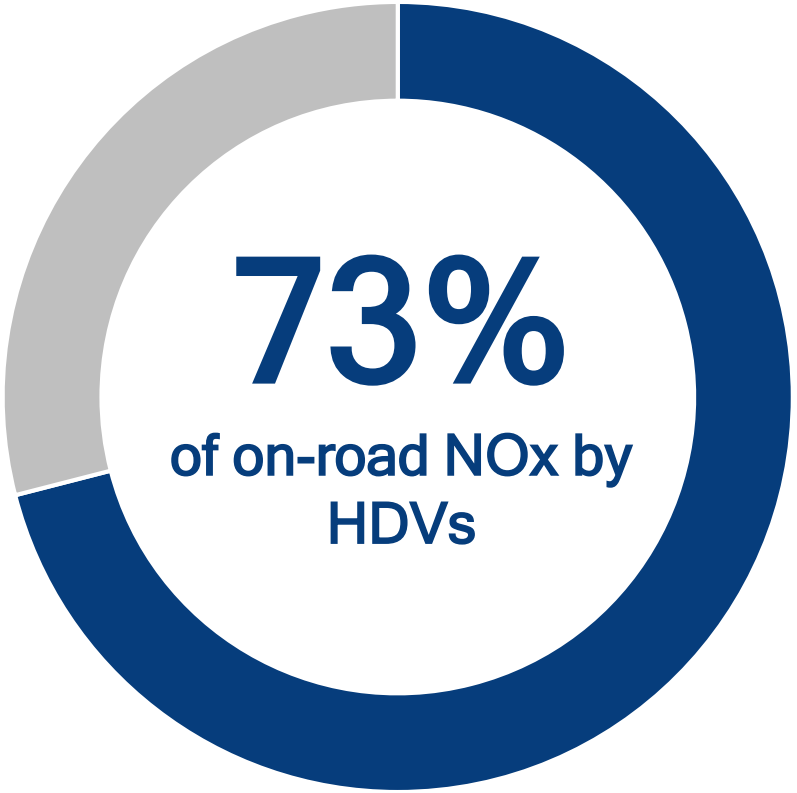
September 13, 2021

More than 280 members changing transportation for good

Commercial vehicles represent a relatively small share of the global on-road fleet but contribute to a disproportionate share of on-road fuel consumption and emissions

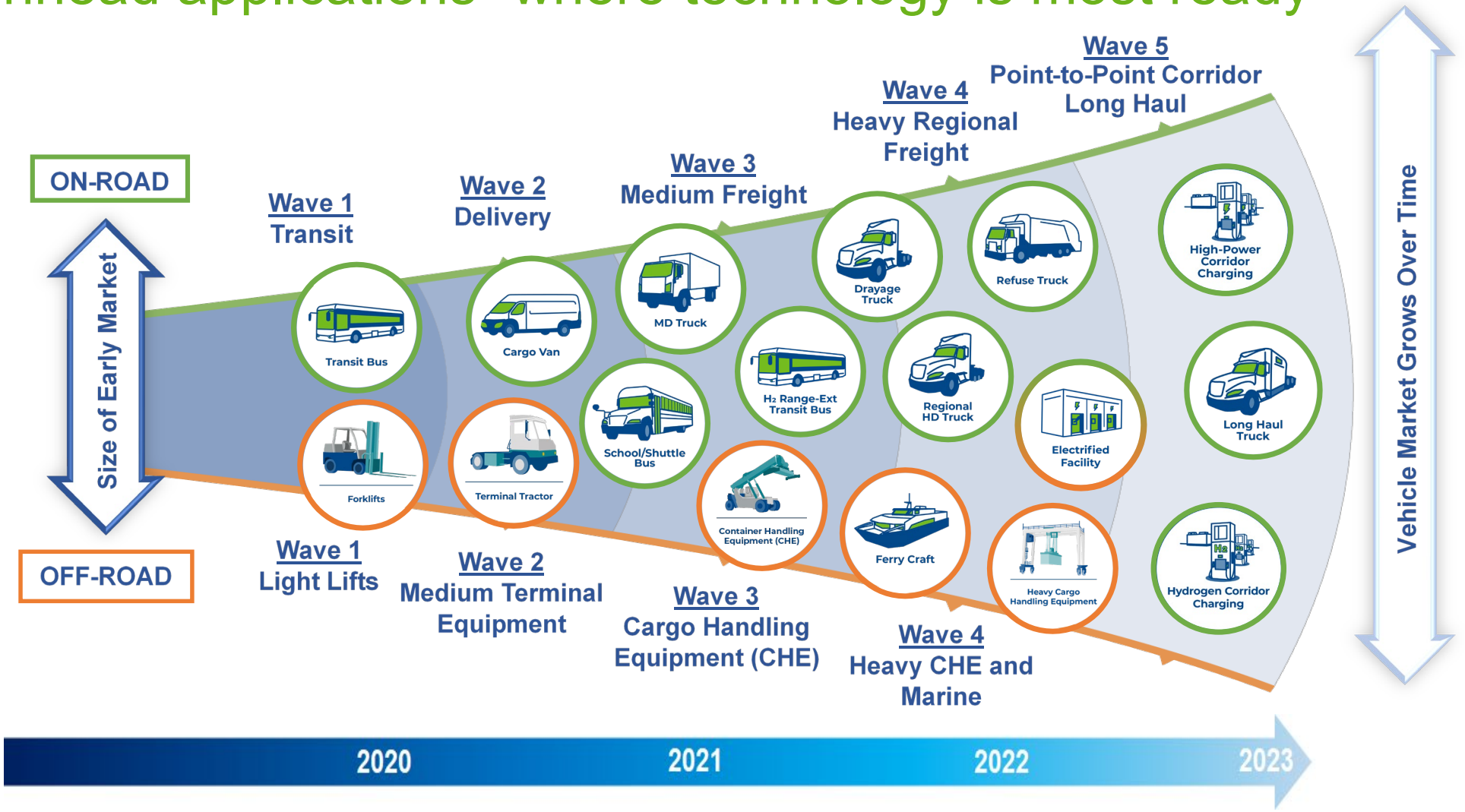






ICCT (2020): Roadmap model

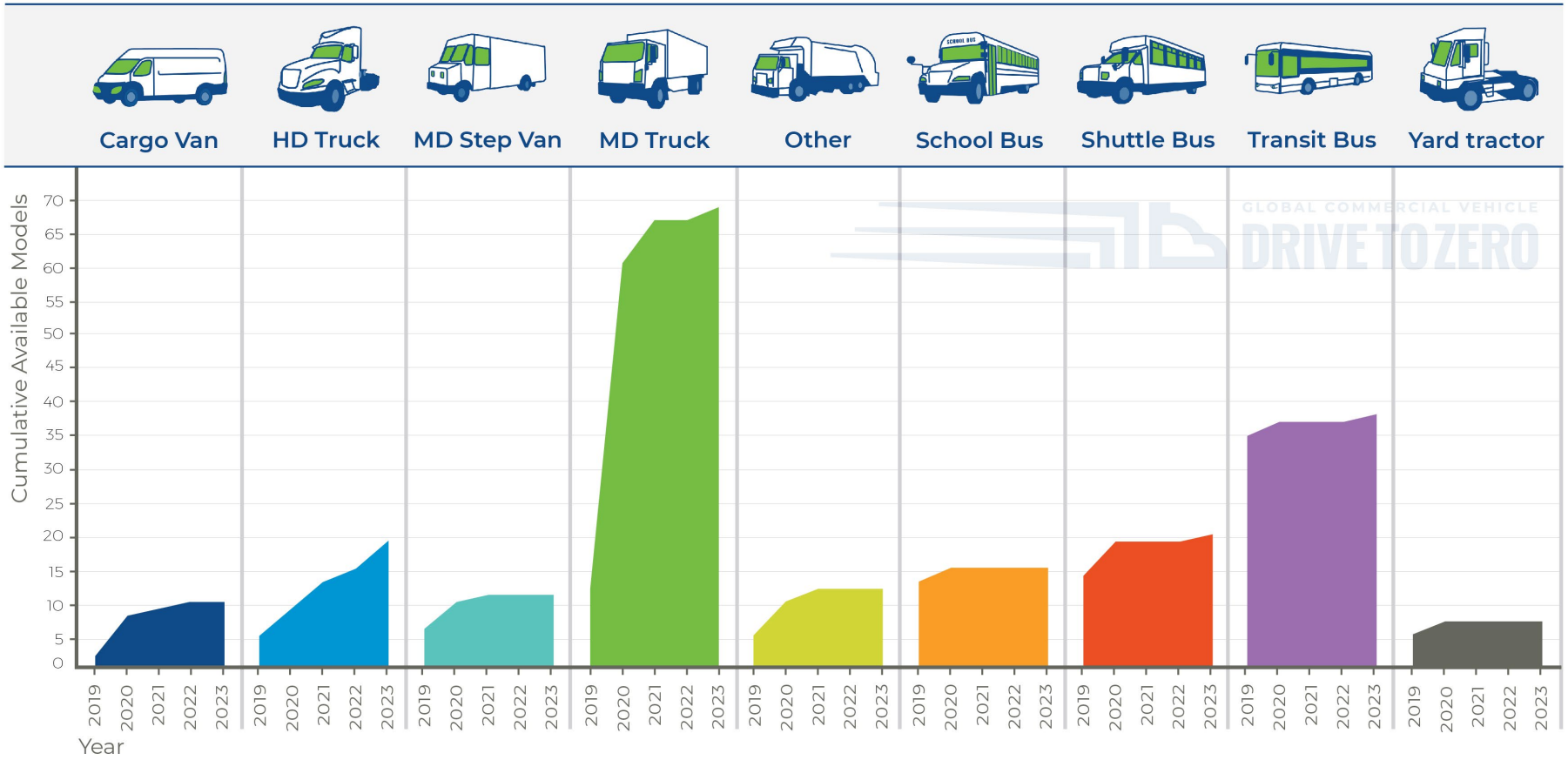
Zero-emission vehicles are coming in waves, taking foothold in “beachhead applications” where technology is most ready



ZECV model availability is strongest in beachhead segments; later-wave technologies need a few more years to catch up

M/HD ZEV model availability growing

Total cumulative vehicle models by vehicle type and year, U.S. & Canada



Source: https://globaldrivetozero.org/tools/zero-emission-technology-inventory/

There are currently more than 30 zero-emission transit bus models available across 15 bus manufacturers in the US




















The ZECV transformation is beginning to reshape the urban delivery landscape







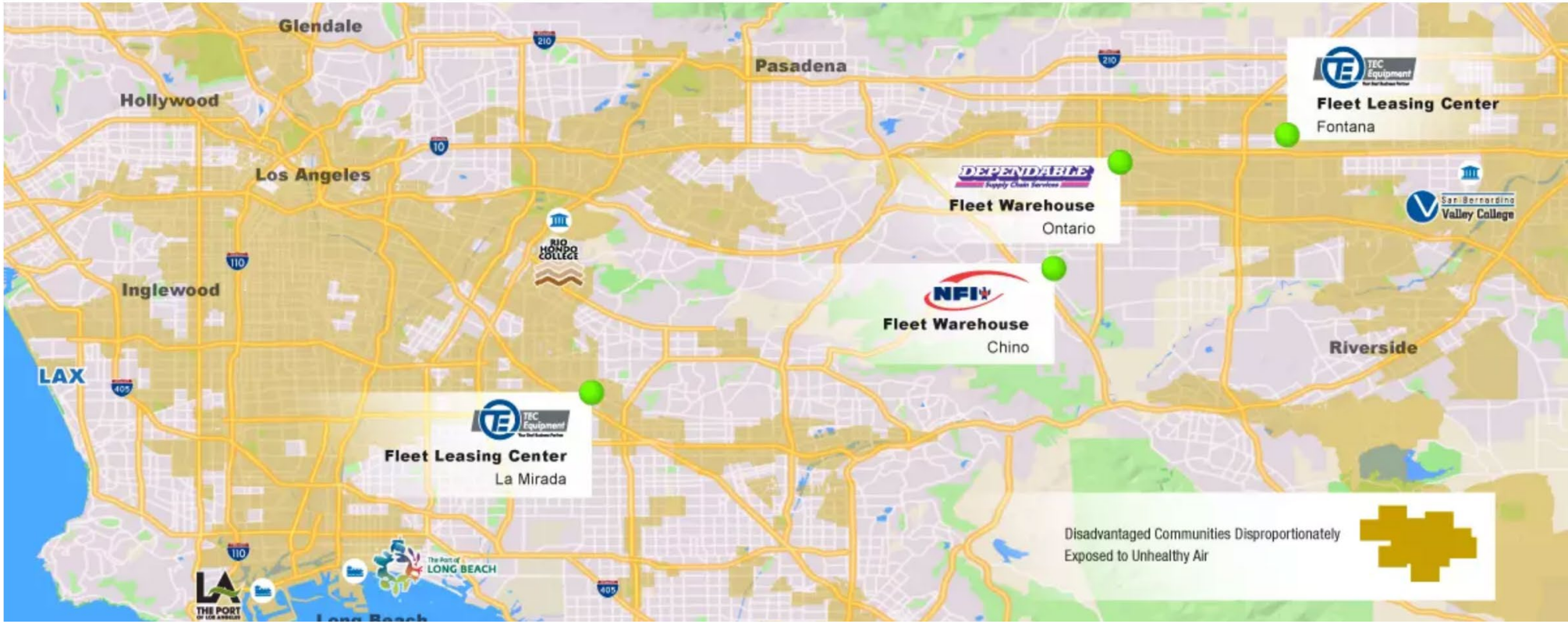
Zero-emission freight vehicles are key to curb increasing freight emissions, mitigate climate change and urban air pollution, and spur technology innovation

Infrastructure beachheads: Earlier-wave applications will rely heavily on depot charging, later-wave applications will need both depot and public charging

- Transit and school bus deployments rely exclusively on private (depot or en route) charging
- Last-mile delivery depends predominantly on depot charging
  - Emerging models centralize storage and charging; shared sites but not truly public
- Drayage has the right duty cycle for electrification but drayage truck ownership is very diverse. Small owner-operators will need fast public charging, larger fleets will likely depot-charge.
- Regional and long-haul will require public charging to supplement depot charging

Volvo LIGHTS

Depot charging (California)

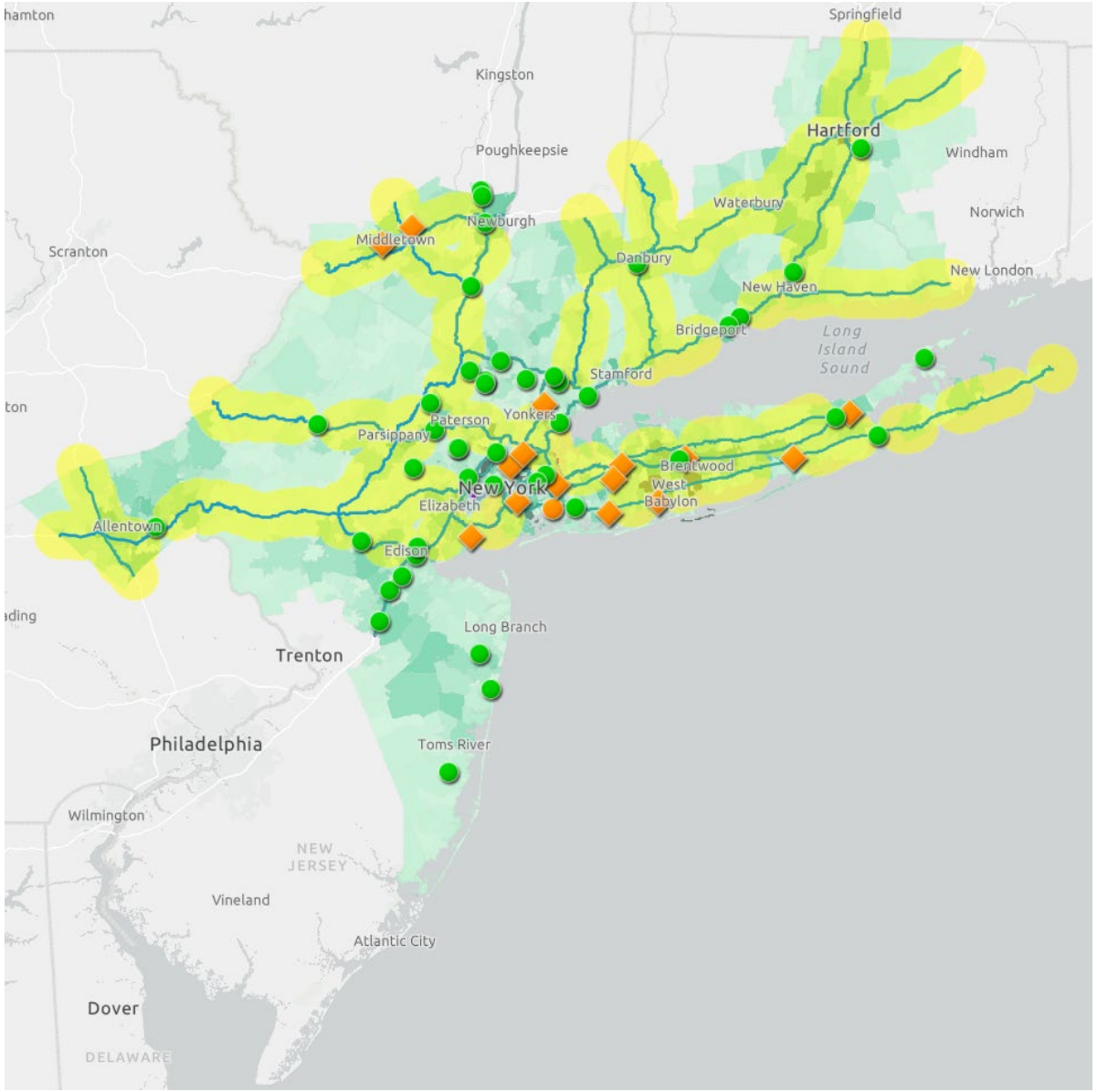


Electric Island

Public charging (Detroit)

Clean Freight Corridors

- Location of public charging is critical for fleet utilization and developer interest
- While HD EV technology emerges, MPOs, utilities, and industry should be engaged to determine where corridor charging will be best situated
- Based on many factors, including:
  - Projected freight volumes
  - Air pollution
  - Utility capacity



GLOBAL COMMERCIAL VEHICLE
DRIVE TO ZERO

A PROGRAM OF CALSTART

To learn more about CALSTART's Drive to Zero program, please visit https://globaldrivetozero.org/

Benjamin Mandel
Northeast Regional Director
CALSTART
bmandel@calstart.org

Drive to Zero is an international multi-stakeholder initiative to accelerate the growth of zero-emission commercial vehicles

CALSTART

GLOBAL COMMERCIAL VEHICLE DRIVE TO ZERO™

2025

Near- and zero-emission commercial vehicles cost-competitive and commercially viable in first-success applications and early-mover regions by 2025.

2040

Zero-emission commercial vehicles dominate new vehicle sales by 2040.

Alliance for Transportation Electrification

Understanding What Medium and Heavy-Duty Vehicle Use Looks Like and How Charging Will Occur

Presented by
Michael I. Krauthamer

Senior Advisor,
Alliance for Transportation Electrification

New Jersey Board of Public Utilities
Docket No. QO21060946

September 13, 2021

Themes

1. Medium/heavy-duty is highly varied; no clear delineations by vehicle or charging
2. Flexibility is key and utilities are essential
3. Incentives are critical

1. Medium/Heavy-Duty is Highly Varied*

Alliance for Transportation Electrification

Closed loop ecosystems

Home base / unassociated destinations

Long-distance

- Many use-cases; charging will take place at a variety of locations; public and private, large and small, fast and slow, near and far
- Limiting to public and high power will add confusion and predetermine outcomes
- High utilization improves charging economics

* Sample use-cases

1. Medium/Heavy-Duty is Highly Varied*

Alliance for Transportation Electrification

Closed loop ecosystems

Home base / unassociated destinations

Long-distance

"When you've met one fleet, you've met one fleet."

- Many use-cases; charging will take place at a variety of locations; public and private, large and small, fast and slow, near and far
- Limiting to public and high power will add confusion and predetermine outcomes
- High utilization improves charging economics

* Sample use-cases

2. Flexibility is key

Customers are all different; examples include:

- Transit
- Municipal & school
- Ports / cargo
- Large, medium, small corporate
- Independent

The market is both nascent and highly fragmented, there will be many charging models, including:

- Private / single customer owned
- Semi-private
- Public / charging hub
- High-power and low-power
- Urban, suburban, and rural

Do not predetermine the outcome

Be flexible and nonprescriptive; apply incentives equally to all customers.

Private capital will respond to incentives.

Utilities are well positioned to enable private capital by reducing cost and uncertainty.

3. Incentives are critical

- Investors will **follow incentives**; NJ is competing nationally and regionally
- As industry learns about electricity as a fuel, **reduce cost and complexity**
- Prime objective is **operational efficiency** and reliability
- Utility incentives, **especially line extension policies** and make-ready funding, lower barriers and reduce uncertainty

Conclusion

- **Companies will adapt**, but only if the economics make sense
- **No one-size-fits-all**, needs vary based on vehicle and charging capabilities
- **Incentives will attract vehicles**
- Independents and **small business will benefit** greatly from utility incentives
- Limiting utility incentives to public locations **predetermines outcomes**
- **Utility investments and incentives can help transform the market**, encourage investments by private third parties, reduce cost and uncertainty with a stable regulatory regime, and increase investor returns
- Be flexible and support a wide array of use-cases; **do not be prescriptive**
- Utilities will be best incentivized through **timely and complete cost recovery**

Alliance for Transportation Electrification

Michael I. Krauthamer

Senior Advisor,
Alliance for Transportation Electrification

michael@EVadvisors.com

Understanding What MDH Vehicle use looks like and how charging will occur

NJ BPU
September 13, 2021

NRG at a Glance

SCOPE

Over
30
generating assets
in 8 states

Approximately
6 Million
customers

STABILITY

Fortune
500
company

Over
$20 Billion
in revenue

SUSTAINABILITY

50%
carbon emissions
reductions by 2025*

net-zero
carbon emissions
reduction by 2050*

*Using 2014 as a baseline

STRENGTH

Over
7,200
full-time employees

EV FLEET CONVERSION GOAL

100% by 2030
Light Duty Vehicles

Facts you can use

8,453 hours
of each year (96.5% of the time)
vehicles[2] remain parked

80%
of EV owners charge
at home or work[3]

63%
of Americans[4] have access
to a garage or carport

31.5 miles
a day[5] is the average distance driven
by Americans (though it takes 51 minutes)

6x per year[6]
– number of times the average
EV owner will use a fast charger

Danita Park

Blog

nrg.com/insights/energy-education.html

Reach out for more questions…

Danita.park@nrg.com

CHARGEVC | NJ

BETTER TRAVEL, STRONGER GRID.

Mater

September 13, 2021

NJ BPU Stakeholder Panel:

Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

Filmore

Mac

Pamela G. Frank, CEO

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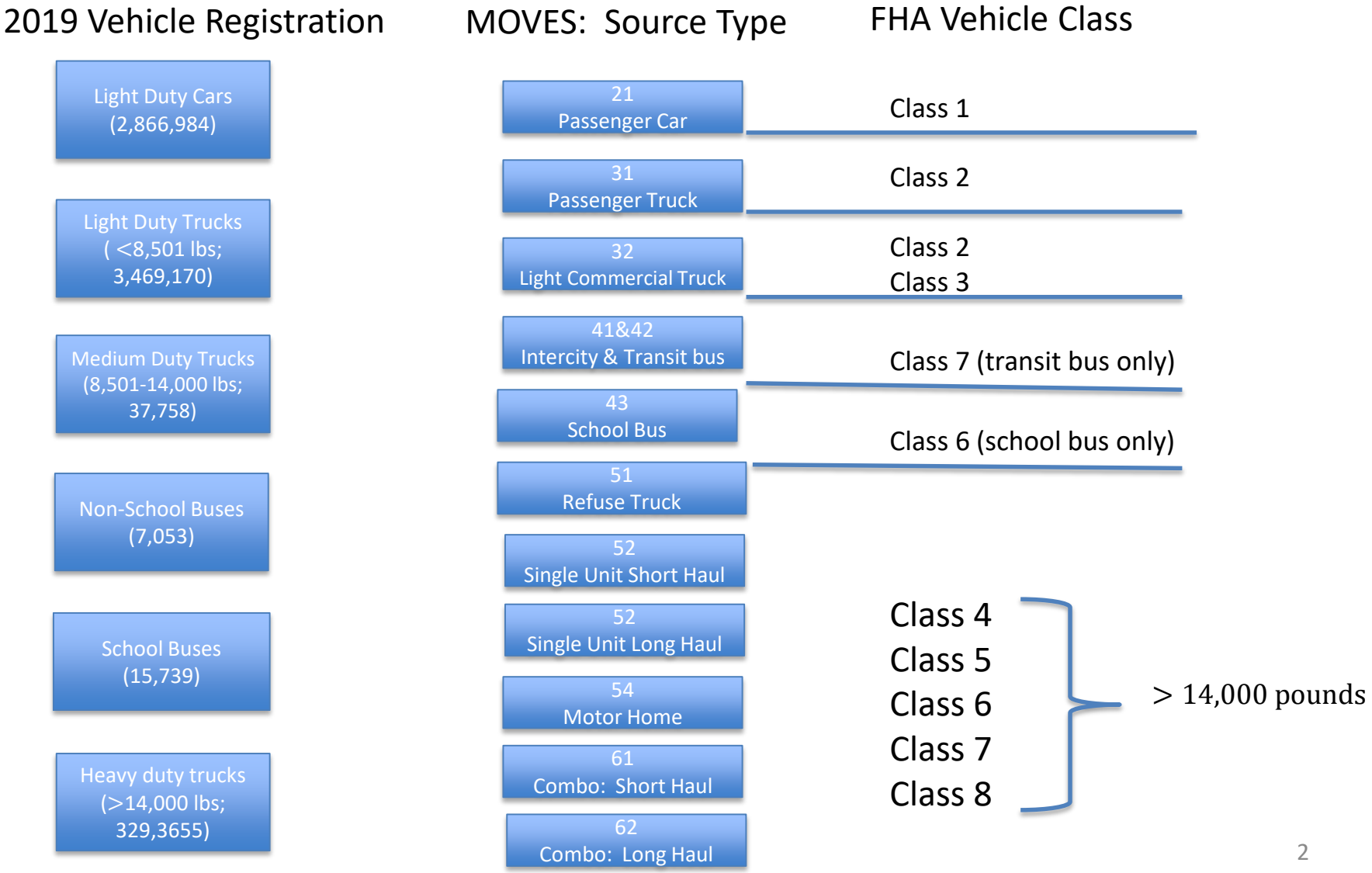
What MHD looks like: MANY SEGMENTS (mapping between classification systems)



What MHD vehicle use looks like

Definitions:
MHD = medium, heavy duty **and** fleets; where medium begins with Class 2.

What it looks like:
Use of MHD depends on USE CASE.
Use will be different within segments and across segments.

Questions to ask:

- How are vehicles used?
- When are vehicles used?
- What are the operational requirements?

Many of the vehicles in this class operate within highly predictable parameters.
This is a good thing.

Delivering big impacts now – recommended focus areas

- **Electric School Bus Program** – to improve equitable access to PEV benefits by addressing first-cost barriers, especially in overburdened communities.
- **NJ Transit** – to address charging infrastructure needs in support of the electrification goals established in New Jersey's January 2020 EV law (P.L. 2019. C.362).
- **Electrification of trucks (class 2&3) and fleets** that operate in, around and proximate to the Ports and accessibility programs for overburdened communities that augment public transit – **distinction between public and private as straw suggests is <u>not helpful</u> in making public health, accessibility and CO2 emissions improvements in this area.**

Note: All of the above may benefit from additional federal investments.

How charging will occur: North Jersey Community Port Electrification Project

Design Parameters

- A project that can demonstrate health harming emission reductions for overburdened communities;
- A project that is replicable;
- A project that helps drive supply chain and innovation to locate in NJ;
- A project that addresses workforce development for overburdened communities.

WHAT $11M + private capital makes possible:

- State of the art truck depot in port adjacent community that incorporates storage;
- 200 electric trucks; at least 50 of which will be class 8 drayage trucks that will operate around the port community footprint;
- Workforce training programs;
- Certification and testing center;
- Fueled by offshore wind.

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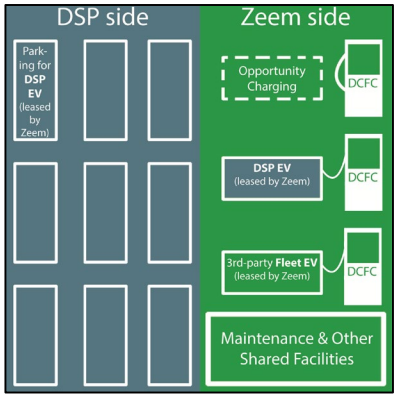
Charging happens when trucks sleep in their depot home.



Trucks charge at night.

Trucks available for use in morning until drop off early evening.

All maintenance and fuel cost included in monthly lease payment.

Target market:

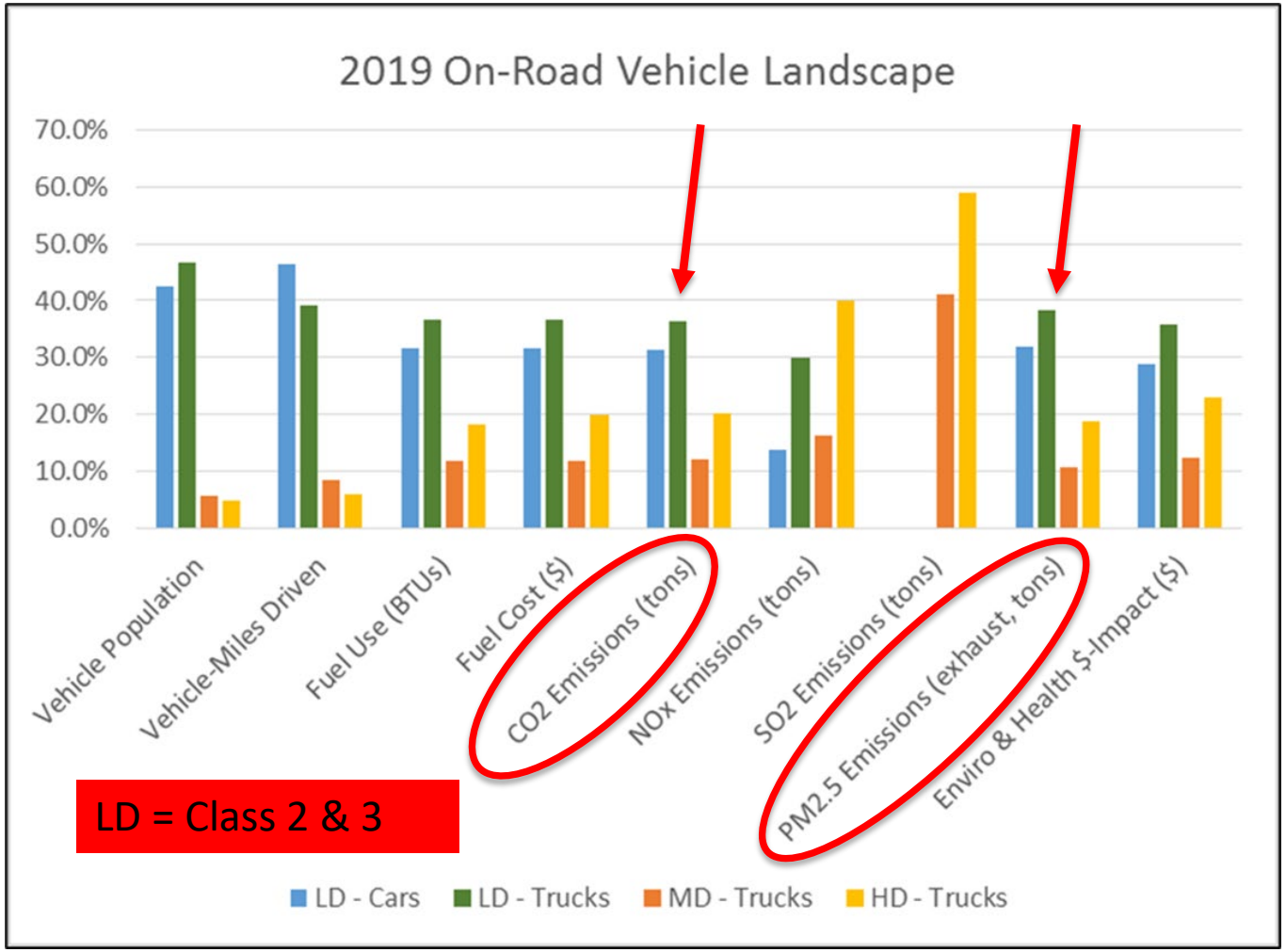
- Class 8 Drayage: Truck travels approximately 80 miles a day.
- Class 2b-3: Truck travel under 200 miles a day.

Summary of Vehicle Electrification Benefits (2021 – 2050)

Benefits	BAU Nat	BAU Man	RE Nat	RE Man
Electricity Cost Savings	$6,581,992,414	$7,592,069,200	$6,489,661,258	$7,265,333,635
PEV Operating Cost Savings	$90,640,730,524	$90,640,730,524	$90,640,730,524	$90,640,730,524
Emission Reduction Savings	$30,206,113,344	$30,206,113,344	$31,564,098,060	$31,564,098,060
Federal Tax Incentives	$1,310,421,272	$1,310,421,272	$1,310,421,272	$1,310,421,272

Source: Figure 8.0 www.chargevc.org/wp-content/uploads/2020/10/ChargEVC-Full-Market-Electrification-Study-FINAL-Oct-7-2020.pdf

What causes what/focus areas



Source: Figure 6.14: www.chargevc.org/wp-content/uploads/2020/10/ChargEVC-Full-Market-Electrification-Study-FINAL-Oct-7-2020.pdf

Electrification schedule

	Limited Feasibility	Expanded Feasibility	Compelling	Widespread	Unavoidable	Saturation
% of sales when threshold is achieved	0.0%	2.5%	16.0%	50.0%	84.0%	100.0%
Source Type						
21 - Light Duty - Passenger Car (BEV)		2020	2024	2030	2038	2045
21 - Light Duty - Passenger Car (PHEV)		2021	2024	2030	2038	2045
31 - Light Duty - Truck (BEV)		2020	2024	2030	2038	2045
31 - Light Duty - Truck (PHEV)		2021	2024	2030	2038	2045
32 - Medium-Duty Commercial Truck (gas)		2026	2030	2034	2038	2042
32 - Medium-Duty Commercial Truck (diesel)		2027	2031	2035	2039	2043
41 & 42 - NJ Transit Buses		2021	2024	2026	2029	2032
41 & 42 - All Other Non-School Buses		2022	2025	2027	2030	2033
43 - School Bus		2025	2029	2033	2037	2040
51 - Refuse Truck		2021	2025	2029	2033	2037
52 - Single-Unit - Short Haul		2023	2027	2031	2035	2039
53 - Single-Unit - Long Haul		2024	2028	2032	2036	2040
54 - Motor Home		2027	2031	3035	2039	2043
61 - Combination - Short Haul		2026	2030	2034	2038	2042
62 - Combination - Long Haul		2029	2033	2038	2044	2049

Source: Figure 4.4: www.chargevc.org/wp-content/uploads/2020/10/ChargEVC-Full-Market-Electrification-Study-FINAL-Oct-7-2020.pdf

Reminder of important themes we have heard so far

- Optionality and flexibility needed – its early days;
- MHD is complex and segmented, with many use cases even within segments;
- Choices on WHEN charging occurs and at WHAT POWER LEVEL has significant implications on costs;
- Fleet adoption will be phased in over time;
- Importance of innovative solutions to address distribution construction timelines – utility does not want to be the bottleneck;
- Holistic thinking necessary – from utility advisory services to ensure efficiency to testing validation and everything in between;
- Importance of integrating storage and using storage to help address utility construction bottlenecks.

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BETTER TRAVEL, STRONGER GRID.

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Phone: 732-296-0770

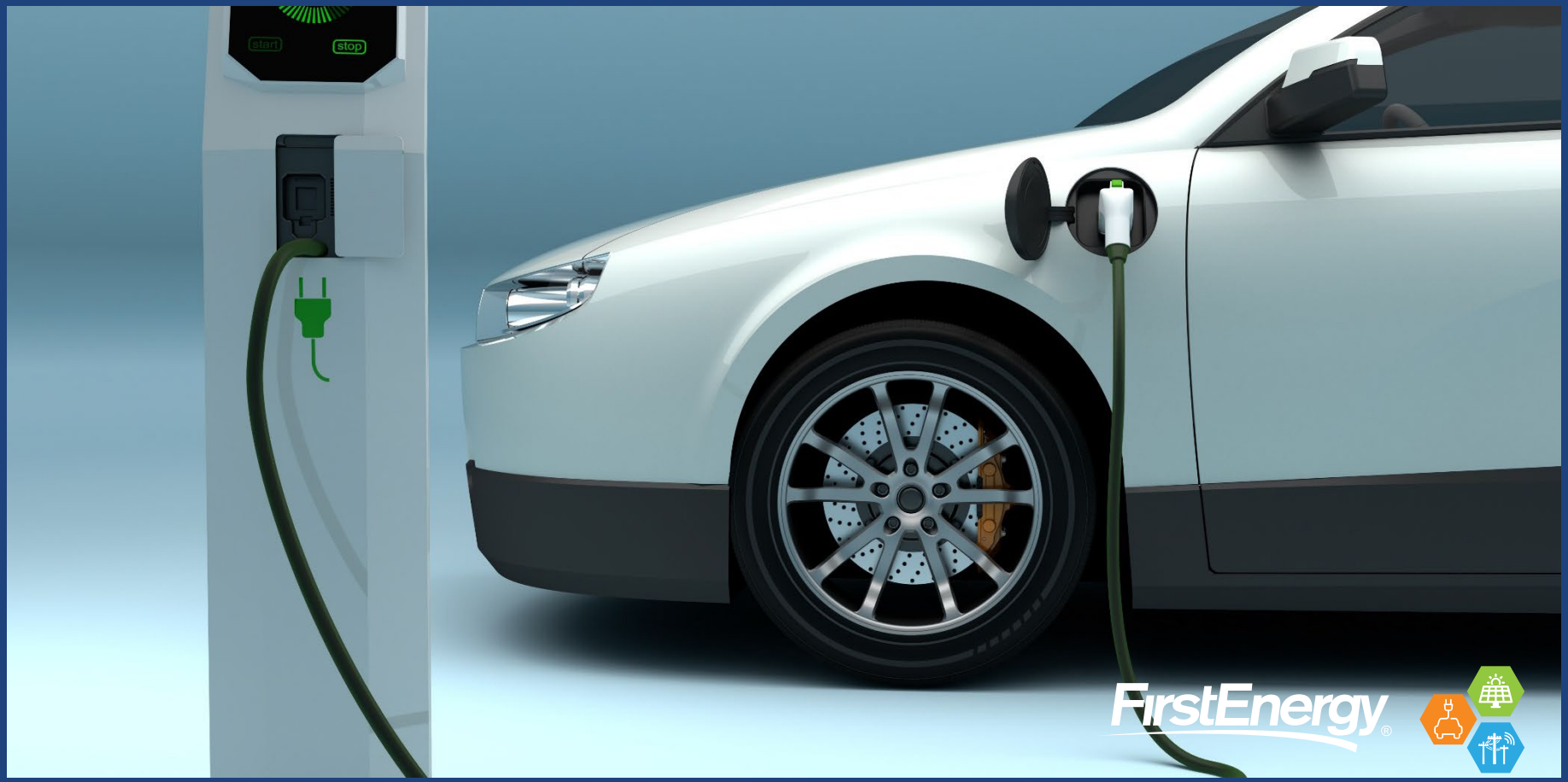
FirstEnergy
Emerging
Technologies

NJ BPU MHD Technical Conference

Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

Mike Huselton
Electrification Policy Analyst,
FirstEnergy, Emerging Technologies Strategy

September 13, 2021



Introduction

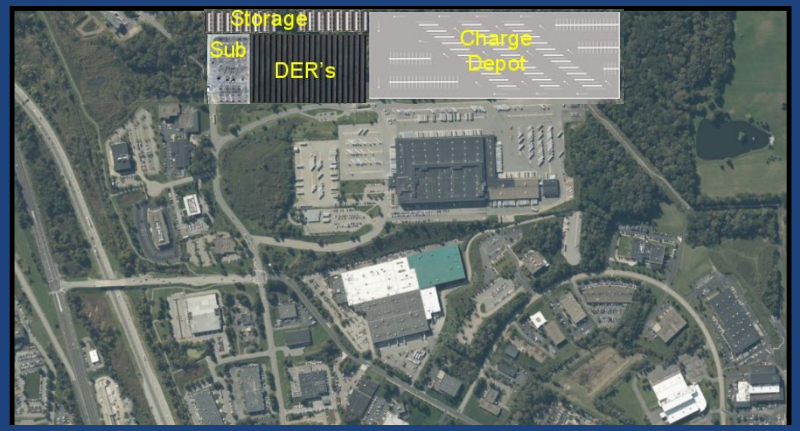
Innovative solutions are necessary to promote adoption and ease the transition to electrified transportation

Market transformations can be unpredictable

We should strive to find efficient options to benefit all stakeholders

Shopping Mall

Travel Corridor



Industrial Park

Option for Consideration

- **Large scale, joint-use depot to leverage the same infrastructure for multiple transportation segments**
- **Made-ready platform able to accept a variety of charging solutions**
- **Ease transition to electrify transportation**

Potential Benefits

- Reduced Infrastructure Costs
- Reduced Maintenance Costs
- Increased Utilization
- Reduced Grid Pressure
- Predictable Location for EV Drivers
- Lower Utility Rates
- Economic Development
- Pairs with On-Site Storage/ DER's
- Autonomous Travel
- Emergency Response Platform

Stakeholder Value

- Fleet Managers
- Independent Operators
- EV Owners
- EVSE Companies
- Utilities
- Urban Communities
- Emergency Response
- Economic Development
- State of NJ

Thank You

UNDERSTANDING WHAT MHD VEHICLE USE LOOKS LIKE AND HOW CHARGING WILL OCCUR

September 13, 2021

STUDENT TRANSPORTATION OF AMERICA®

ABOUT THE NJSBCA

NJSBCA membership consists of more than 50 private school bus contracting companies, representing best-in-class school transportation services in New Jersey. The NJSBCA provides year-round professional development programs to its members covering a wide range of topics of interest to owners, technicians, driver-safety trainers and support staff.

- The NJSBCA works with members and constituents to maximize the benefits of private/public sector cooperation. As an integral part of New Jersey's public transportation infrastructure, the organization advocates for safe and efficient school transportation to school districts, lawmakers and rule makers.

- The NJSBCA appreciates every opportunity to re-affirm the importance of our mission to safely and efficiently transport children to school and related activities. We are proud of the highly trained and credentialed people we employ to deliver these services, and we will continue to be a major piece of New Jersey's vital transportation infrastructure.

NJSBCA
NEW JERSEY SCHOOL BUS CONTRACTORS ASSOCIATION

NJSBCA ELECTRIFICATION EVENT

In June, the NJSBCA held an in-person event that attracted more than 100 participants to learn about electrification of the school bus fleet.

» Speakers features representatives from NJ Clean Cities, the NJDEP, NJR Clean Energy Ventures, and a variety of other infrastructure and funding entities. Additionally, the four major school bus manufacturers displayed electric buses on site at the conference. Interest has continued to be high and the Association plans to have on-going follow-up events.

ABOUT STA

Student Transportation of America (STA) has a long-standing commitment to fuel choices and leads the charge to promote a more eco-friendly busing community. STA pioneered this initiative by acquiring the largest initial fleet of propane vehicles. STA has also long championed the use of electric, compressed natural gas, and ULEV vehicles.

- In 2012, STA purchased 400 propane-powered vehicles—the largest all-propane school bus fleet in the United States—to serve public schools in Omaha, Nebraska.

- We continue to expand our "Green Fleet" initiative in markets across the country, including New England and Pennsylvania, and were the first to introduce propane and alternate-fuel vehicles to communities in Sanford, Maine; St. Paul, Minnesota; Grand Junction, Colorado; Canby, Lake Oswego and Tigard, Oregon; and others.

- To date, STA has replaced more than 2,700 diesel-engine school buses with alternative fuel vehicles, and we received a Green Fleet Magazine Sustainability All-Star Award for our leadership.

PILOTING OUR PILOT PROJECTS

The Company began to invest in electric vehicles in 2019. We continue to lead the industry with alternate powertrain and EV technology, most notably with our current EV pilot initiative in certain rural, suburban, and urban markets.

- We have funded this initiative through a variety of grants, incentive projects, and strategic partnerships. Our partners include Vermont Energy Invest Corporation, the New Jersey Department of Environmental Protection, and the Hybrid and Zero-Emission Truck and Bus Voucher Project. The goal of our pilot programs is to gather real world intelligence as to how things like climate and regional traffic congestion impact EV battery life, generalized vehicle wear and tear, and other critical KPIs.

- Our electric vehicle pilot programs are a natural progression of our forward-thinking commitment to propane and lower-emission alternatives, as STA moves further into eco-conscious student transportation.

FOCUSING ON OPPORTUNITIES

The Company has teams in place that are dedicated to advancing our work in alterative fuels as we focus on delivering more eco-conscious student transportation.

- STA has a dedicated Green Team comprised of Safety, Operations and Maintenance personnel to ensure that all aspects of our current procedures are reviewed and updated as needed. This team also evaluates the feasibility of implementing EV/alternative fuel vehicles in the different markets we represent across North America.

- Within our company we have developed a team that pursues grants through federal, state, local and private funding sources. We examine opportunities across our operating areas for grants that align with our electrification strategy.

TOOLS TO GET THE JOB DONE

STA has developed tools to examine the feasibility of introducing EV's into its fleet.

- We know that many of our customers understand the benefits of an electric fleet of buses. However, EV buses are a very different type of vehicle, which requires a unique support infrastructure.
- As a company, we recognize that there is a place for EVs when you take a holistic view of our customer base. We have identified potential sites for either our EV pilot program, or for a conversion.
- Every customer is different in terms of size, location, environmental factors, etc., so we developed a checklist that our field team uses as a guide when partnering with our customers regarding the feasibility of placing EVs into the fleet for service.


THANK YOU
STUDENT TRANSPORTATION OF AMERICA®

Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

Presentation to:

New Jersey Board of Public Utilities

Date:

September 13, 2021

PROTERRA

Proterra's Mission

Advancing electric vehicle technology to deliver the world's best-performing heavy-duty vehicles

- Over a decade of EV deliveries
- Offices and manufacturing in CA and SC
- 700+ employees, with strong transportation expertise
- **> 1,000** vehicles sold to **> 130** customers across **43** states and provinces
- **> 20,000,000** service miles
- **> 50** MW charging infrastructure installed
- **> 100,000,000** pounds of CO_2 emissions avoided

PROTERRA OVERVIEW

PROTERRA

Leading provider of commercial electric vehicles and technology for fleets

Proterra ZX5 Transit Bus

Proterra Powered™ Vehicles

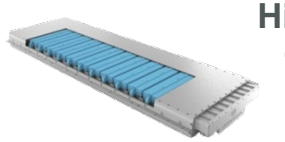

School bus


Coach bus

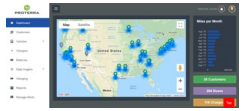

Delivery truck


Shuttle bus


High power charging

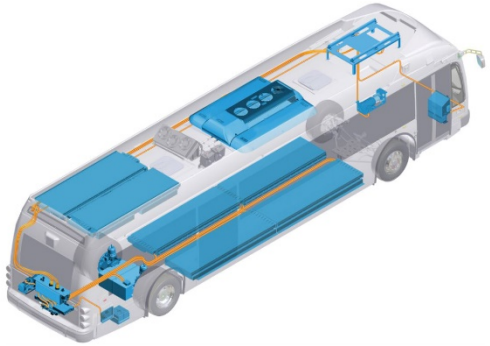

Energy-dense battery pack


High efficiency drivetrain


Energy management

SCENARIO: DEPLOYING ONE ELECTRIC BUS
KEY QUESTIONS

- When determining how an electric bus will perform in a fleet, there are several key factors to consider:
  - How much **battery storage** do you need on board?
  - What kind of **drivetrain** should you choose?
  - What kind of **charger** is the best fit for your needs?
- To answer these questions, we need know:
  1. **How much energy will be required** to meet the needs of a specific route this bus needs to travel?
  2. **How much time is available to charge** the bus?

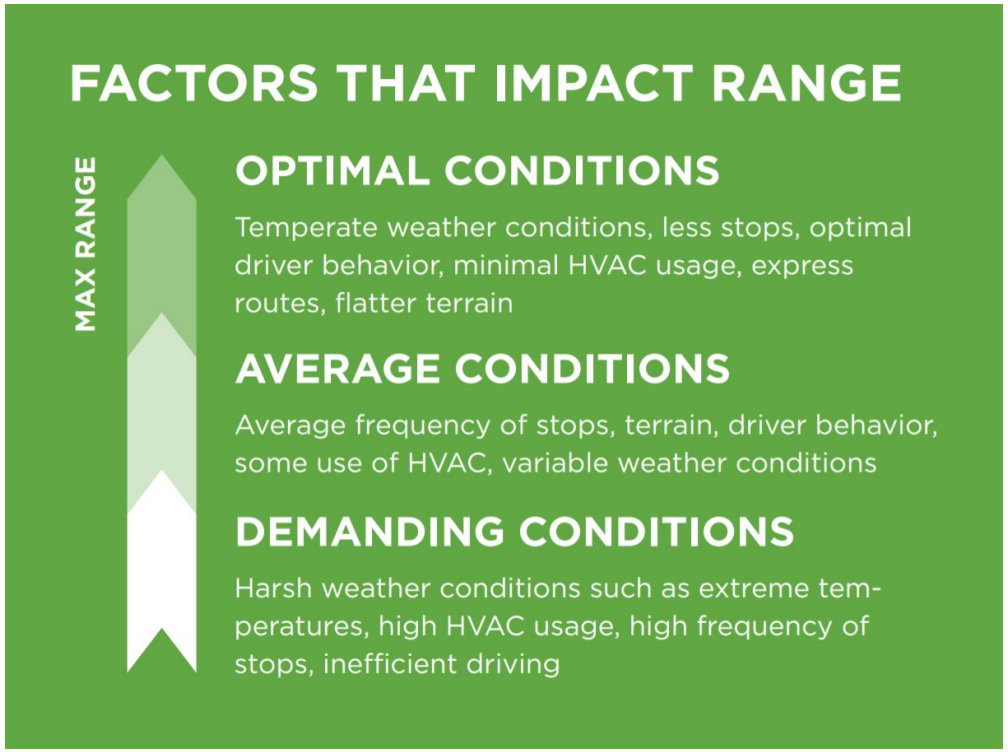


With the right data, you can **right-size your project** so you end up with the best bus and charging system for your needs.

SCENARIO: DEPLOYING ONE ELECTRIC BUS
OPERATING RANGE

- **Determining how much energy will be needed**
  - Daily distance
  - Terrain
  - Passenger load
  - Weather
- **Determining how much time is available to charge**
  - Leave & return times
  - In-depot schedule

$$\text{Operating range} = \frac{\text{Usable energy in battery pack (kWh)}}{\text{Operating efficiency (kWh/mile)}}$$



BEYOND ONE BUS – A FULL FLEET VIEW
KEY CONSIDERATIONS

How do the considerations change when looking at an **entire fleet** and not a pilot project?

CONSIDERATION	SOLUTION
DIFFERENT SCHEDULES Need to account for hundreds of different vehicles' block schedules, each with unique daily distances & efficiencies	Access to full route data to run route analyses for an entire fleet based on existing operations
INFRASTRUCTURE HARDWARE COSTS With one charger per vehicle, infrastructure hardware costs are high and asset utilization is low	Advanced modeling and fleet-scale charging solutions reduce number of chargers needed & lower hardware costs
ELECTRICITY COSTS If vehicle charging is unmanaged, fleets can incur much higher electricity costs	Fleet modeling analysis determines best time to charge each vehicle to significantly lower electricity costs
INSTALLATION COSTS Without reducing power demand with managed charging, installation and grid interconnection costs are higher	Lowering total power requirements for fleet with managed charging greatly reduces grid interconnection costs

PROTERRA CHARGING SYSTEMS FOR EV FLEETS

LARGE FLEET SOLUTIONS

1.5 MW Charging System: Can charge up to 20 vehicles simultaneously

SMALL FLEET SOLUTIONS

Available in 60 kW, 90 kW, 120 kW, 150 kW, and 180 kW configurations

THANK YOU

PROTERRA

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Understanding What MHD Vehicle Use Looks Like and How Charging Will Occur

Prepared For: New Jersey Board of Public Utilities

Date: September 13, 2021

ChargePoint: Complete Hardware Portfolio Powered by Software

Comprehensive Hardware Portfolio Delivers

+ Solutions for every use case, all vehicle types and brands
+ High efficiency in power and footprint
+ Modular, scalable, secure architecture designed for serviceability
+ Unparalleled quality; advanced testing (vehicle, functional, climate, environment) for long-term reliability
+ Options for site hosts to use custom branding

Software Enables

+ Control of who can use stations and when
+ All vehicles to get charged on time
+ Multiple vehicles to share power
+ Drivers to get in line when ports are occupied
+ Proactive and remote diagnosis
+ Power management to avoid demand charges

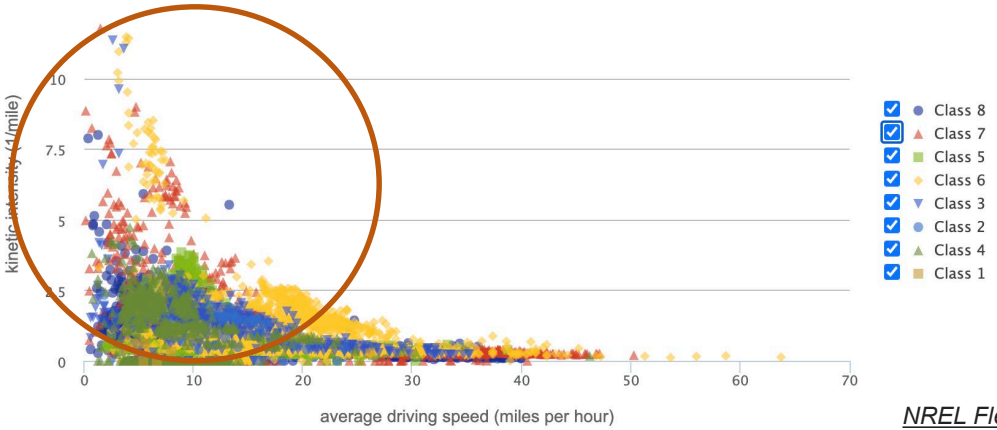
Mapping out Medium & Heavy-Duty Fleet Charging

	Charging Mapped to Workflow	Integrations	Business Models
Depot 	+ Parked + Loading/Unloading + Cleaning	+ Route & Dispatch Software + Vehicle Telematics + Utility Rate Schedules + Energy Management + Building Management Systems	+ Purchase + Finance + Third Party Own/Operate + Hybrid variants
On-Route 	+ Fast charging + HOS/3rd Party Parking	+ Fuel Cards + Roaming Partnerships	+ Off-take agreements + Third Party Own/Operate

MHD Fleet “Order of Operations” for Utility Programs

“[…] over 75% of vehicles are operated on shift schedules where they are **parked for more than six hours per day** in the range of Class 3 to 8 segments”

NACFE/ACT Survey, 2019



NREL Fleet DNA, 2020

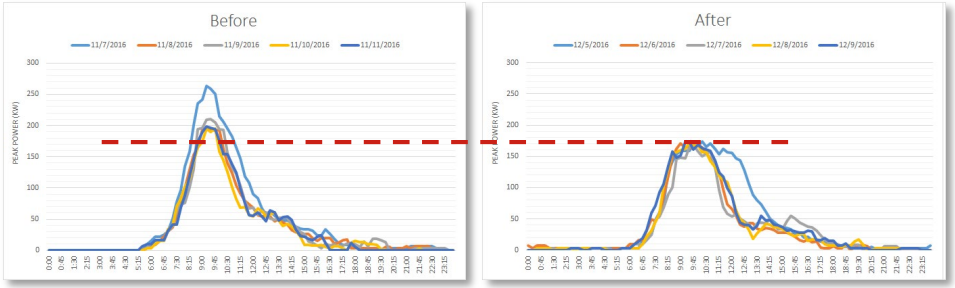
Low Speeds + Frequent Start/Stop = Good Candidate for EV

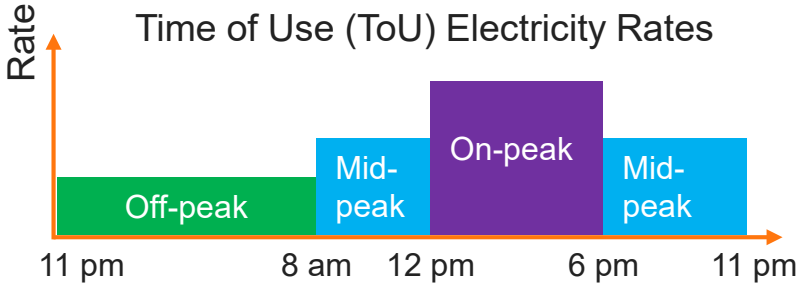
Important to consider both capital and operating costs

- **Capital Costs**: Upfront incentives & make ready infrastructure programs can help overcome *capital cost barriers* to deploying EVSE.
  - Incentive programs should be simple, flexible, and ensure that EVSE providers can work hand-in-hand with fleet providers, as well as with utilities.
- **Operating Costs**: More work is necessary to address *operating cost barriers* in a sustainable manner, particularly for public and commercial fleets.
  - Sustainable & non-discriminatory electricity rates must be established to send appropriate price signals to customers and avoid unintentionally penalizing fleets.
  - Fleet operators are in the best position to effectively interpret price signals and manage charging needs for vehicle fleet.

Power Management Benefits All MHD Use Cases

- **Power Share:**
  - Intelligently share available power across multiple stations
  - Set a limit not to exceed available power or to avoid expensive demand charges
- **Load Shift:**
  - Use energy when it is cheapest, usually at night when Time of Use (TOU) charges are lower
- **Load Limit / Demand Response:**
  - Manage load via building/energy management systems
  - Participate in utility DR programs





Recommendations for All MHD Program Designs

- **Fleet Control of Charging:** Critical for utilities to ensure that all fleet operators participating in programs can charge vehicle fleet as needed for duty cycles.
- **Avoid One-Size-Fits-All Solutions**: Program participants should not be limited to one sole vendor for installation, maintenance, hardware, or software.
- **Complement, Don't Compete**: If utilities are permitted to offer "advisory" or "concierge" services, they shouldn't impede EVSE providers to interact w/ site hosts.
- **Flexibility for Depot Realities**: MHD programs should allow installation on either new **or** existing service.
- **Connector Standards**: Prioritize standards-based connectors (e.g., CCS-1; J1772), while allowing for hardware innovation.
- **EVSE Power & Type**: Critical to be agnostic about power requirements, while encouraging future-proofing.
- **Minimum Functional Requirements**: Networked EVSE should be required.

Thank You

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