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# UTILITIES ROLE TO SUPPORT M&HDV ELECTRIFICATION IN NEW JERSEY



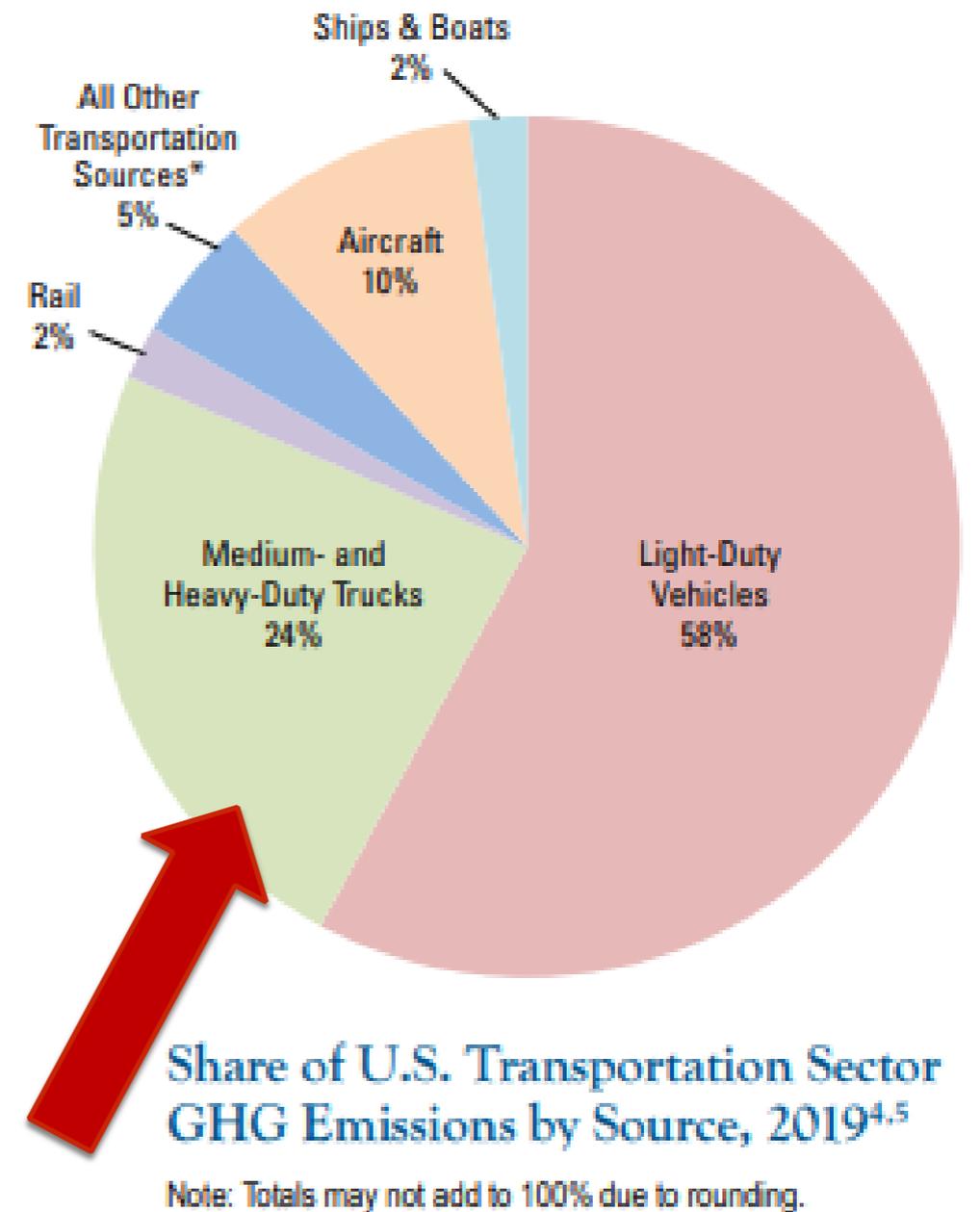
*KATHY HARRIS*

August 24, 2021

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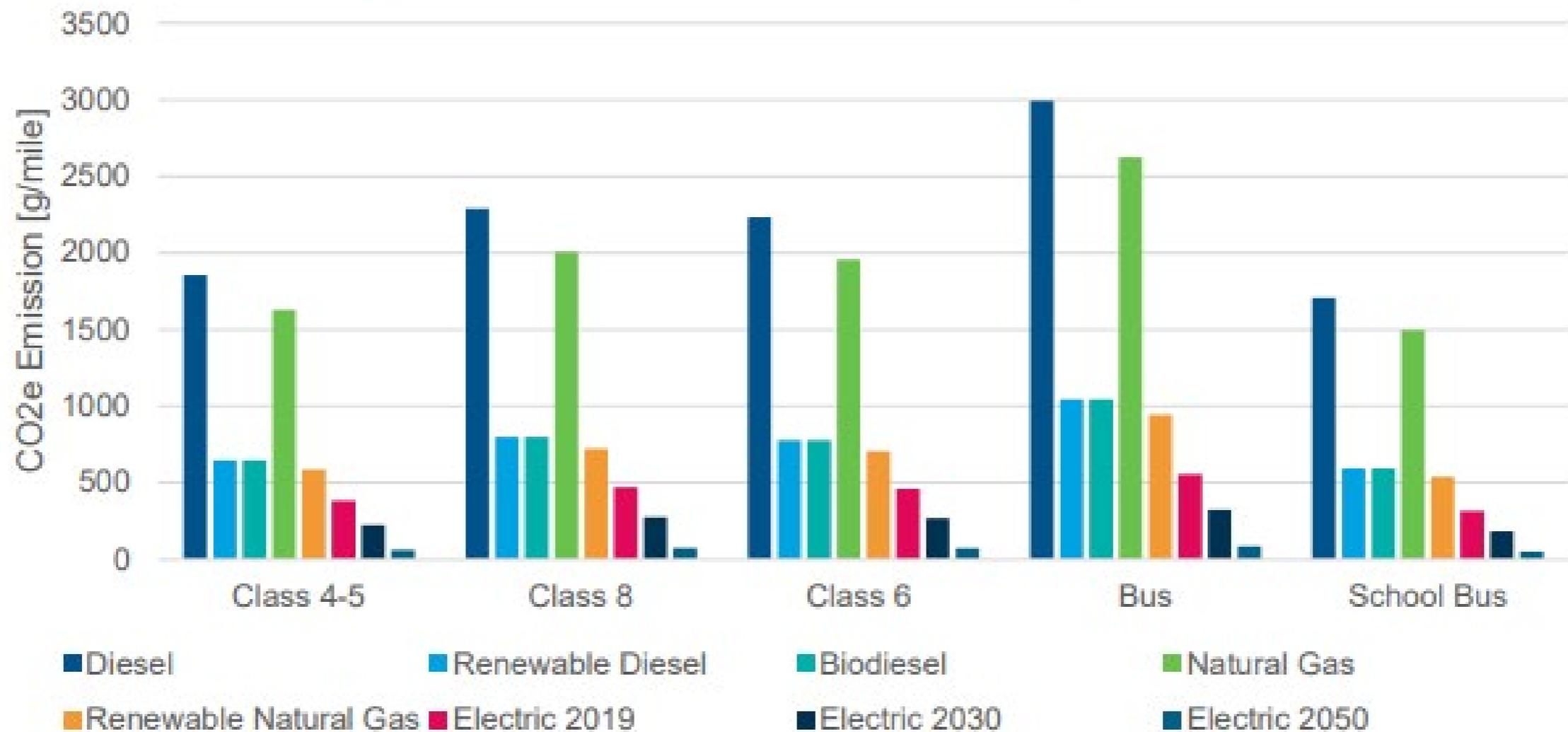
# Why Is Transportation Electrification Important?

- Transportation Accounts for 41% of GHG Emissions in NJ
- MHDVs are responsible for
  - 7.6 million metric tons of GHG emissions each year (20% of all transportation)
  - 44% NOx pollution from the transportation sector
  - 39% of particulate matter from the transportation sector
- Highly concentrated emissions in urban areas, low-income communities and communities of color



# Air Quality Benefits from Medium and Heavy-Duty EVs

Figure II-3. GHG Emission Factor Summary (g/mile)

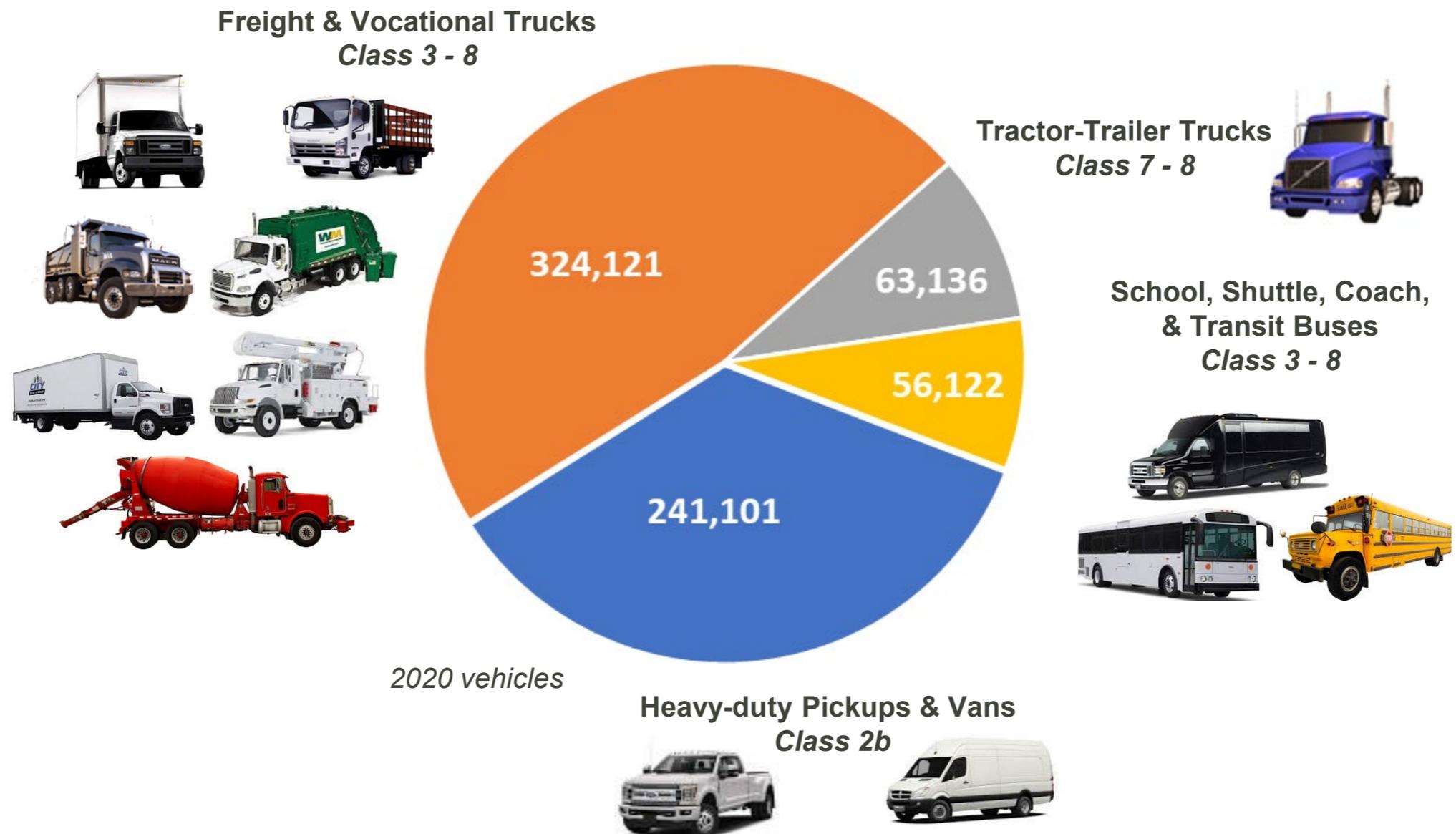


A photograph of the front of a blue and purple Kenworth truck. The truck has a prominent chrome grille with the Kenworth logo (a shield with 'K' and 'W') in the center. There are orange emergency lights on the roof and sides. The truck is parked on a paved surface with trees and a clear blue sky in the background. A white text box with a thin black border is overlaid on the left side of the image, containing the title and a list of benefits.

# Additional Benefits of M&HDV Electrification

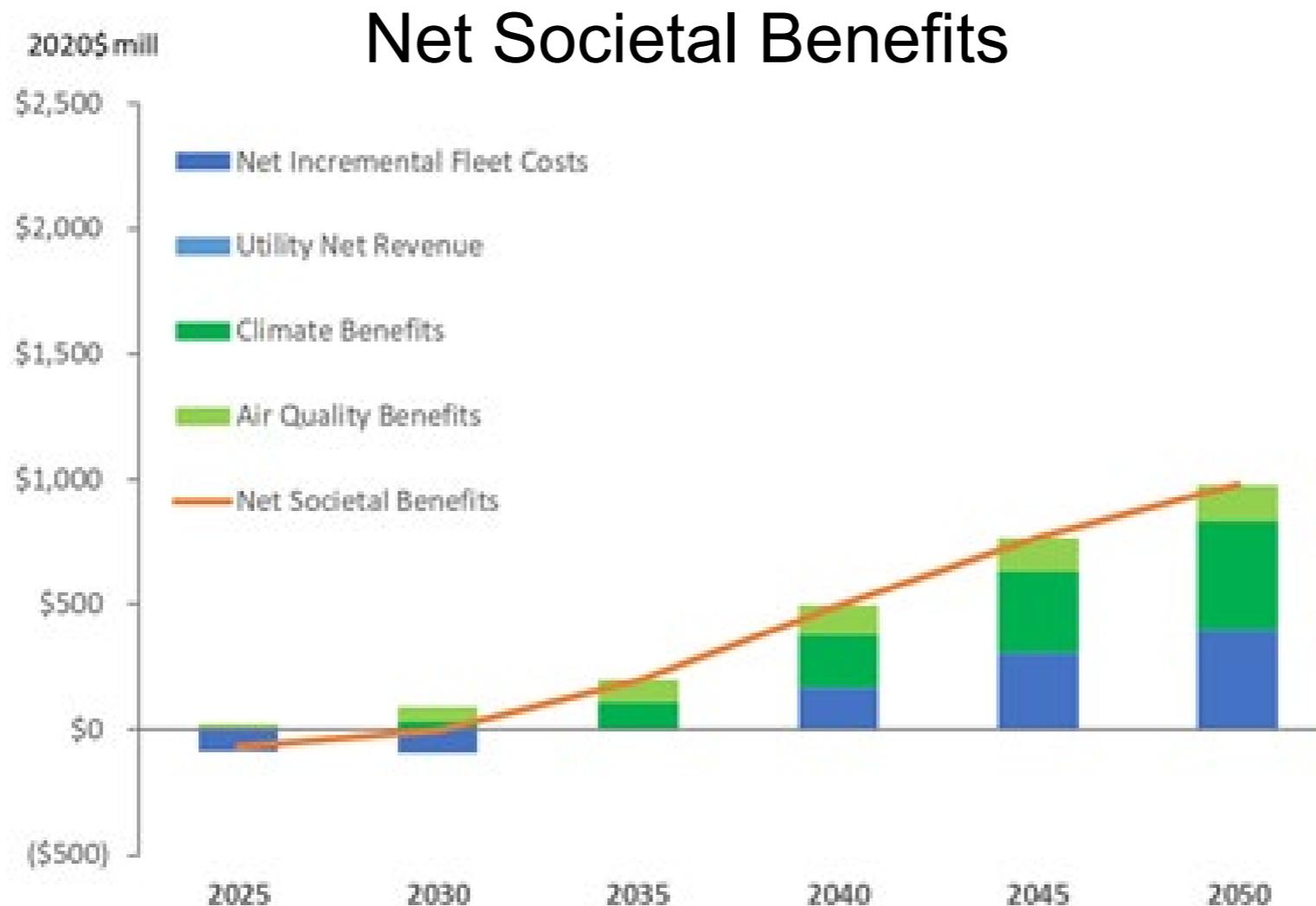
- Lower Total Cost of Ownership
  - Rebates and incentives available to help reduce delta
  - More predictable and consistent fueling prices
- Provides environmental, health and air quality benefits
- Ensures that *all* New Jerseyans have access to clean transportation
- Cleans up trucks and buses that drive through communities (especially those by ports, highways, and warehouses)

# Medium- and Heavy-Duty Vehicles in NJ



# Benefits of M&HDV Electrification

- Through 2050, clean truck rules will:
  - Save New Jerseyans 228 premature deaths and 135,770 illnesses
  - Reduce GHG emissions by 18.9 million metric tons
  - Reduce NOx emissions by 82 percent



# State Programs and Policies

NJ 80x50 goal through the Global Warming Response Act

NJ Zero-Emission Vehicle Incentive Program

Medium- and Heavy-Duty Memorandum of Understanding

- Goal of 100% electric MHDV sales by 2050

EV Law

- Requires the installation of 200 public fast charging stations (400 ports) through 2025

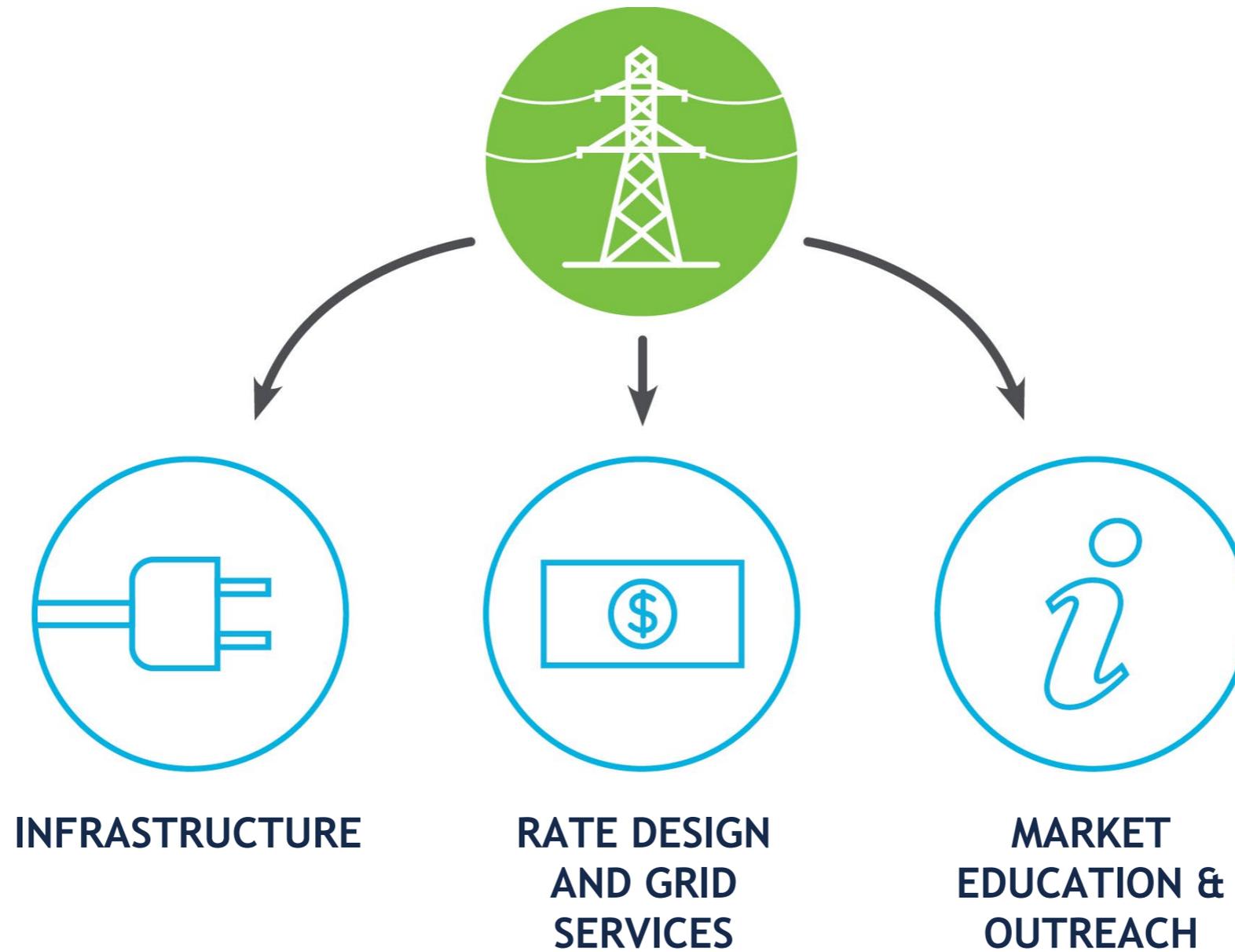
Potential for ACT/ HDO Rules

- Increases the number of electric M&HDV on the road
- Cleans up the vehicles that can't yet electrify

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# Utility Actions to Accelerate Transportation Electrification

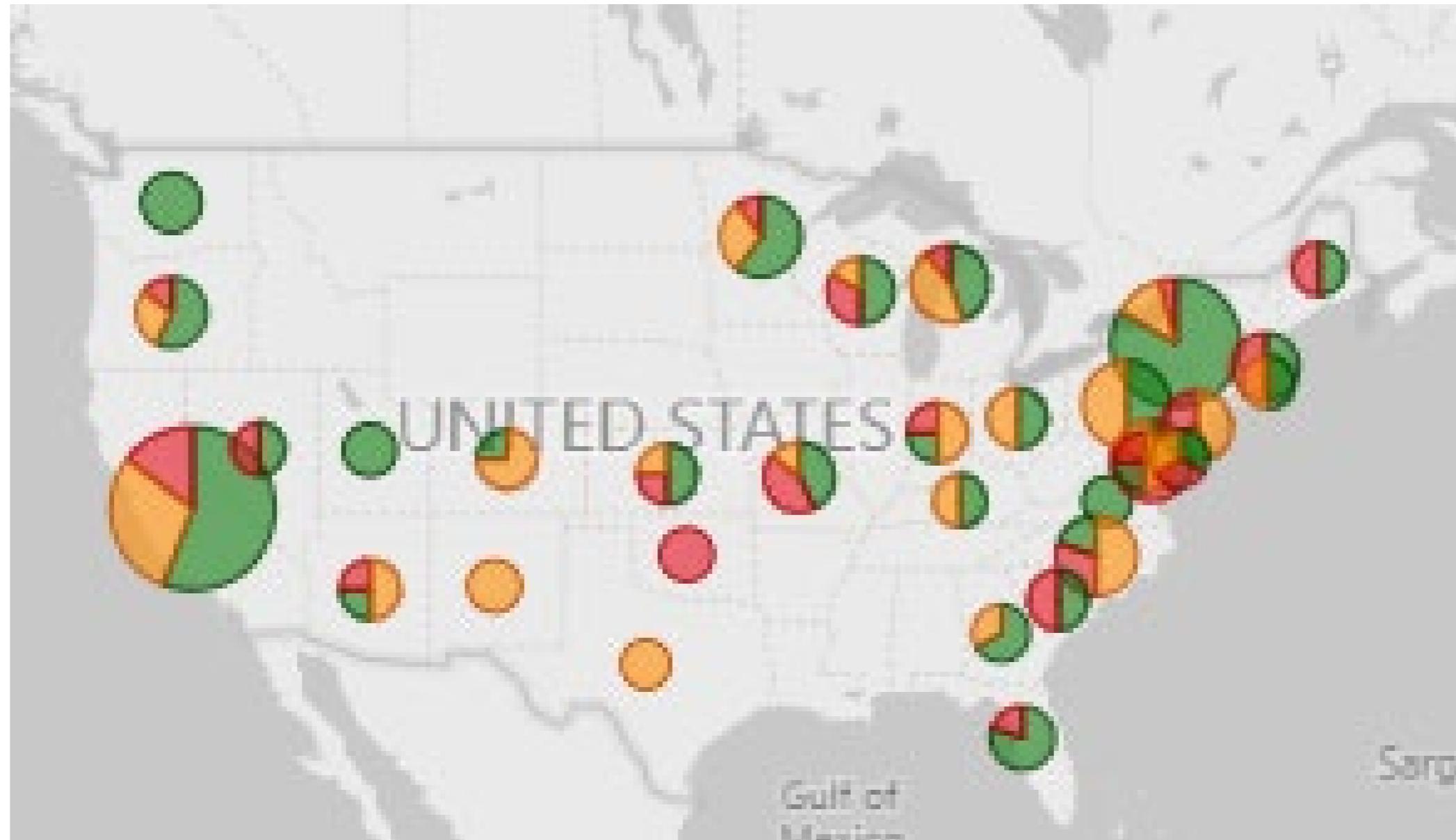
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# Utility Transportation Electrification Investments

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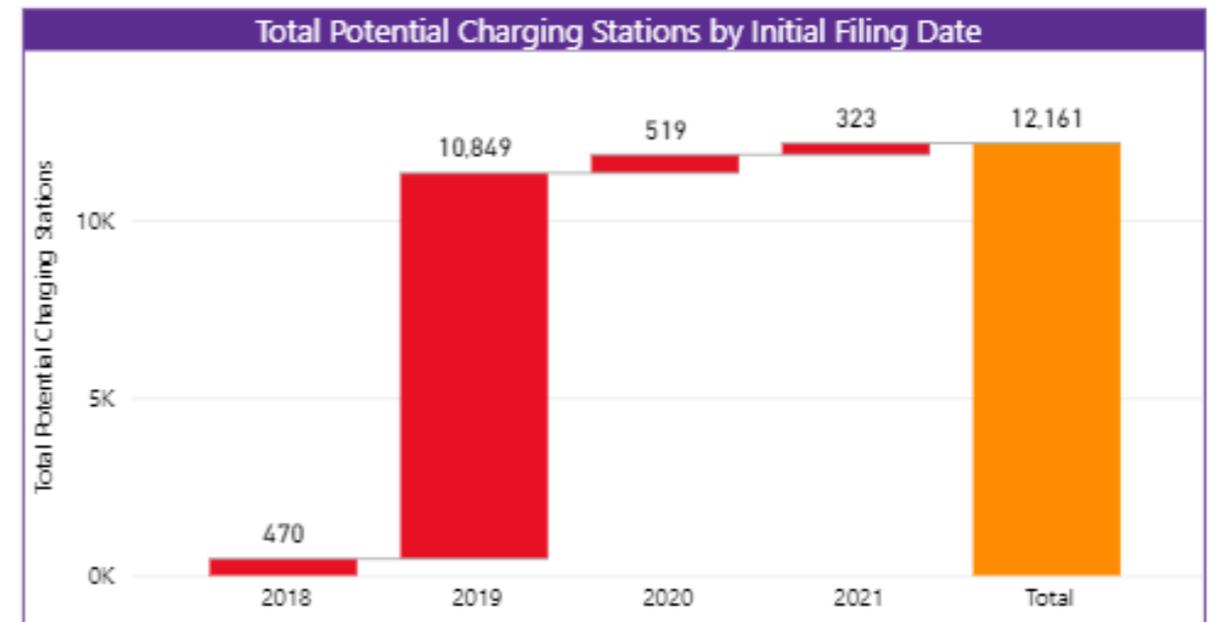
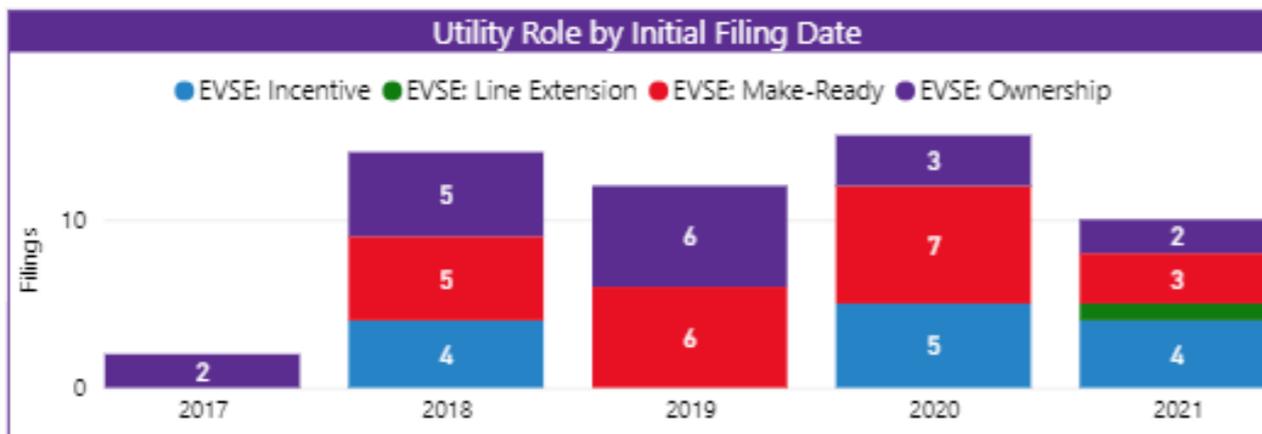
# Utility M&HDV Investments

## EV Charging

This dashboard contains details on filings related to EV charging.

[Reset to Default](#) | 
 [HELP](#) | 
 [PREVIOUS](#) | 
 [NEXT](#)

Filters and Selections			
Selected States	Selected Utilities	Selected Dockets	Selected Filings
20 States	24 Utilities	36 Dockets	40

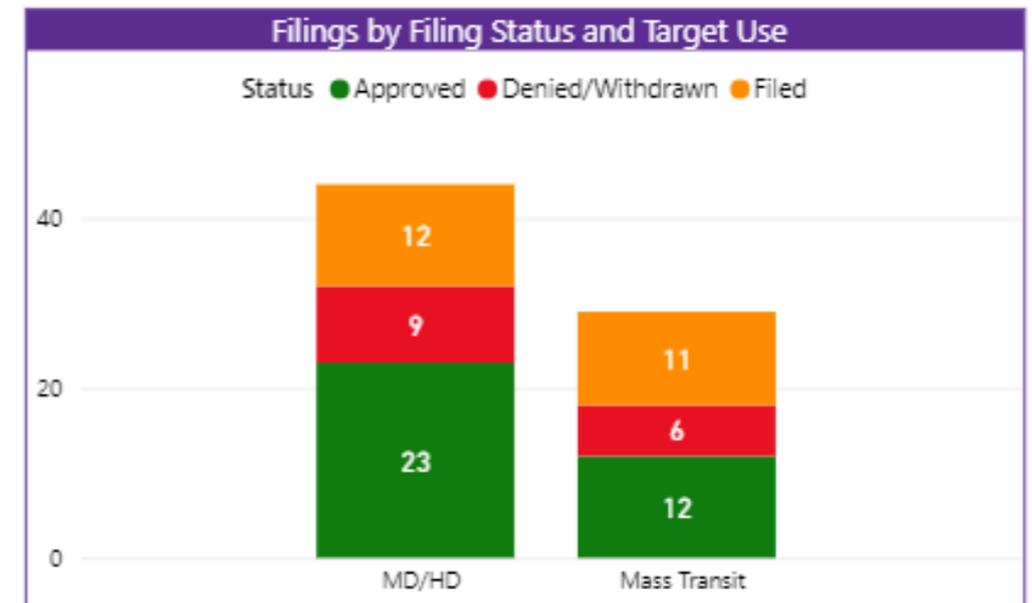
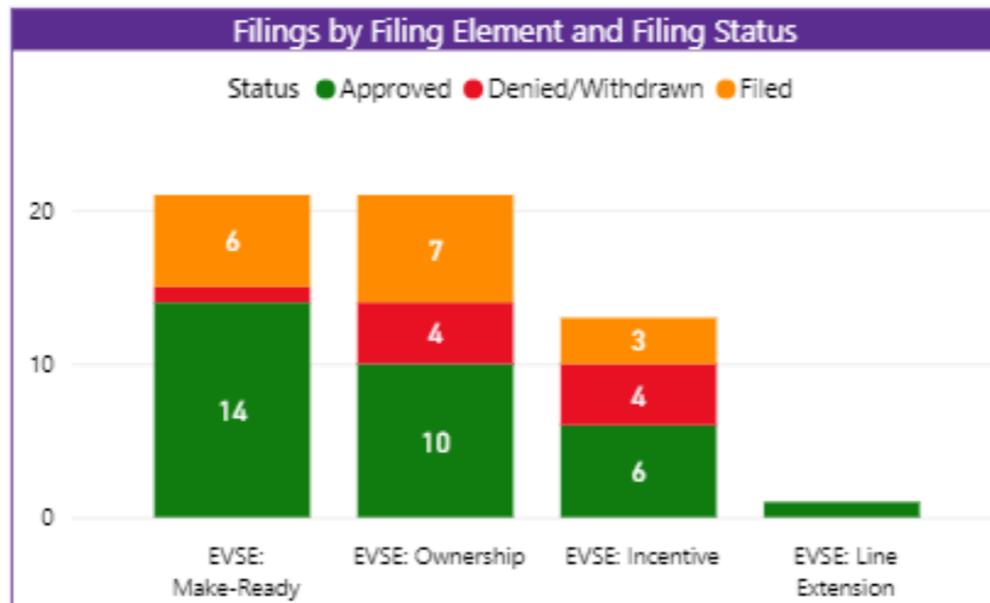


### Summary Statistics

\$1,146,174,949
Investment
11,686
L2 Charging Stations
475
DCFC
25,915
MD/HD Charging Stations

DATA BY FILING STATUS

DATA BY U.S. EIA REGION



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# THANK YOU

Kathy Harris  
[kharris@nrdc.org](mailto:kharris@nrdc.org)



# Supporting Fleet Electrification Customers

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Medium- and Heavy-Duty Ecosystem Panel

Kellen Schefter, Edison Electric Institute

[kschefter@eei.org](mailto:kschefter@eei.org)

Tuesday, August 24, 2021



# Different Fleet EV Use Cases Require Different Charging Solutions

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Source: [Amazon](#)

## Last-mile delivery

Package delivery

Overnight, depot charging

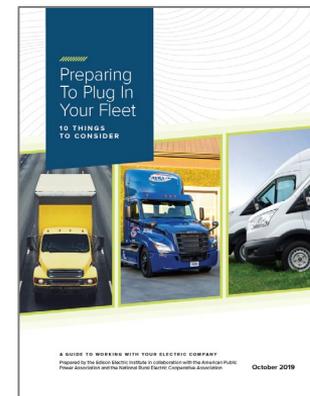
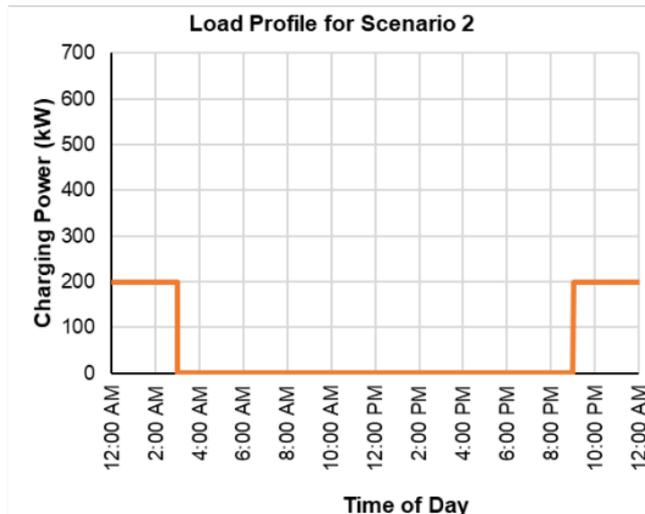
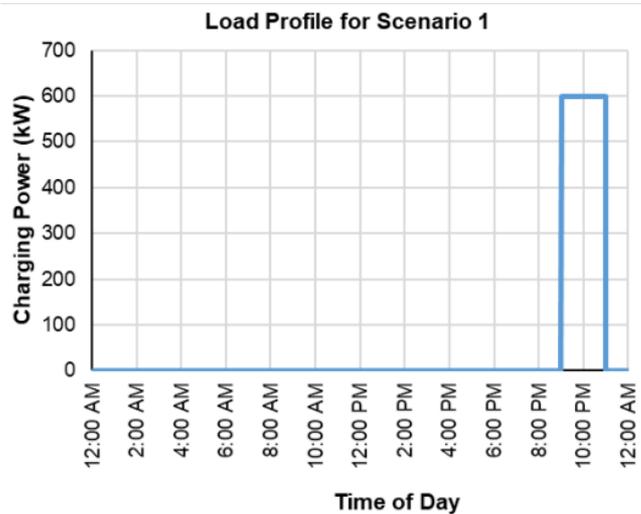


Source: [Penske](#)

## Short-haul freight

Grocery

Charging between shifts/routes



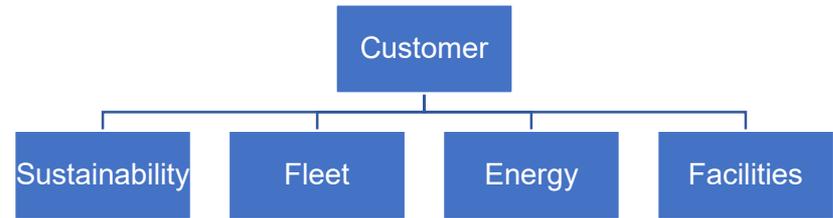
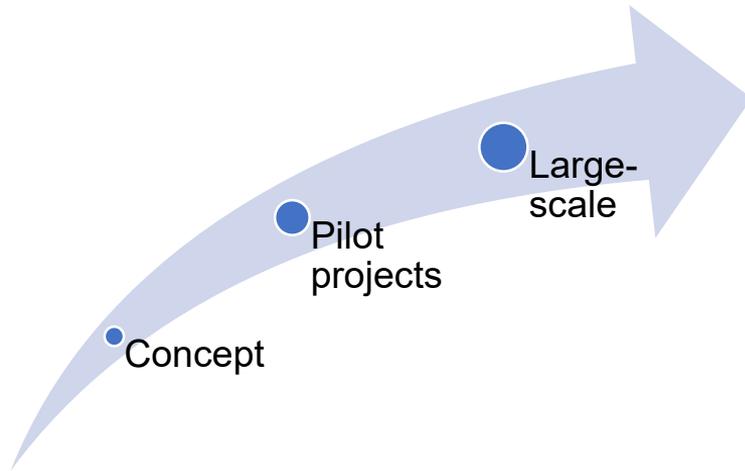
Scenario 1	Scenario 2
4 EV trucks charging at 150 kW	4 EV trucks charging at 50 kW
Charge for 2 hours (9 p.m. to 11 p.m.)	Charge for 6 hours (9 p.m. to 3 a.m.)
Peak demand: 600 kW	Peak demand: 200 kW
Daily energy delivered: 1,200 kWh	Daily energy delivered: 1,200 kWh
Monthly electric bill: \$8,905	Monthly electric bill: \$4,105
Effective electric cost: \$0.37/kWh	Effective electric cost: \$0.17/kWh

## Preparing to Plug In Your Fleet

Electric bill depends on charging strategy

# Electric Company-Customer Engagement

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- **Engage early:** electric service upgrades for large-scale site may take 18-24 months
- **Strategic partnership:** understand the customer's power needs and long-term plans
- **Communication is key:** customers need to work across silos and leverage account managers as the single point of contact

# Electric Company Support for Fleet Customers

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## Business As Usual

- Power
- Interconnection
- Rates

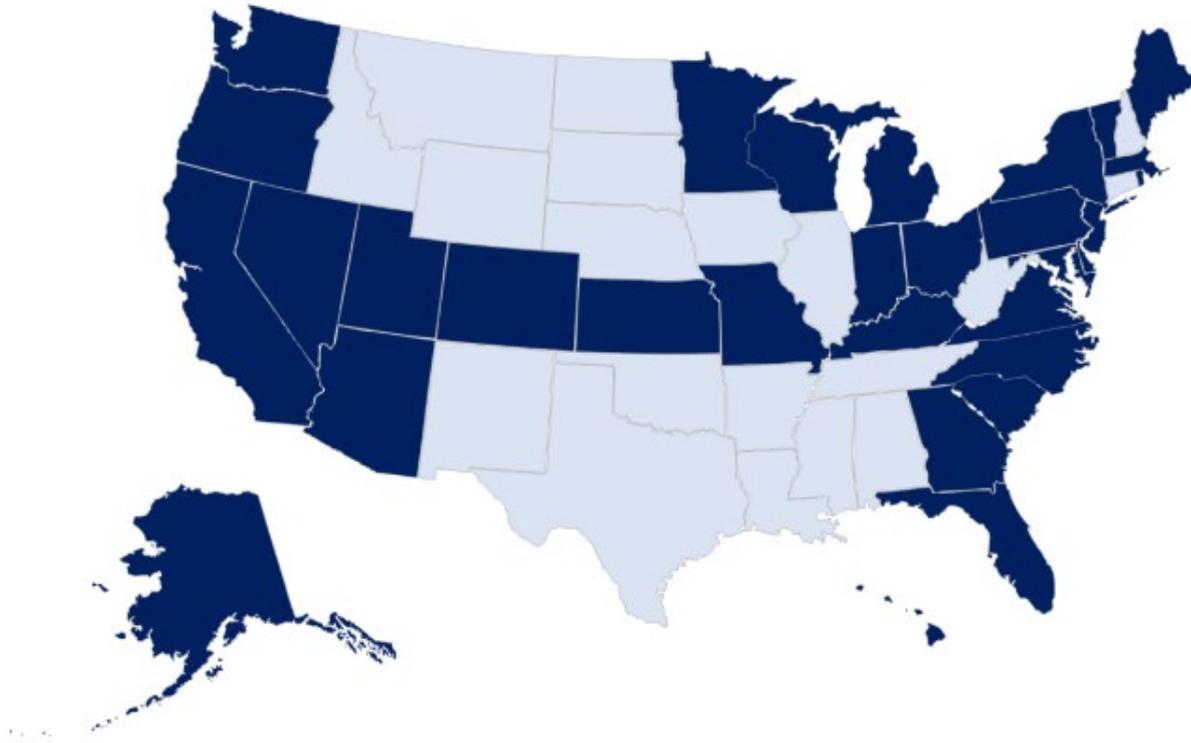


## Customer Programs

- Advisory Services
- EV Charging Infrastructure
- EV Charging Rates

# Many States have Approved Electric Transportation Programs

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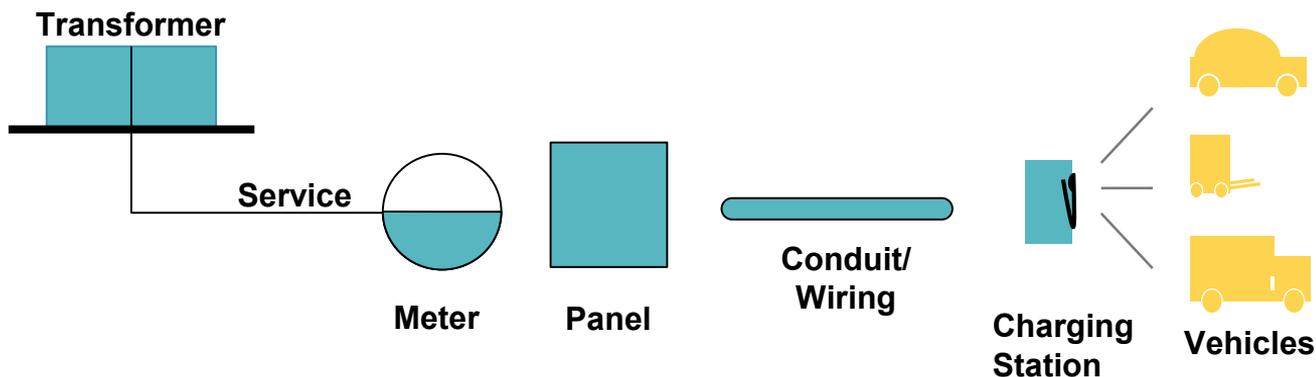


**52** electric companies

**31** states plus DC

Approx. **\$3 billion**

# EV Charging Infrastructure Programs



Service Connection	Supply Infrastructure	Charging Equipment
Electric company	Customer	Customer
Electric company	Electric company	Customer
Electric company	Electric company	Electric company

*Incentive-based*

*Utility-constructed make-ready*

*Utility-owned/operated*

8/24/2021

# Medium- and Heavy-Duty Ecosystem

New Jersey BPU Stakeholder Meeting



# About Greenlots

Together with Shell and our partners, Greenlots is powering the transformation to electric mobility to create a more sustainable future. Our industry-leading software and services equip drivers, site hosts and network operators to efficiently deploy, manage, and leverage EV charging infrastructure at scale.

We provide what our customers need: expertise, solutions, and support to transition to electric and flexible solutions that deliver economically effective, reliable charging at scale.



Founded in **2008**  
with over a decade  
of experience



Headquartered  
in **Los Angeles,**  
California



Acquired by **Shell  
Renewables and  
Energy Solutions**  
in January 2019



**Global footprint** with  
offices throughout the  
US and in Canada, India,  
Singapore, and  
Southeast Asia



Over **170  
Employees**  
and contractors  
worldwide



**Working with**  
utilities, cities,  
automakers, fleet  
and retail customers  
across the US and  
the world

# Major corporations are electrifying their fleets



Purchasing 10,000  
electric delivery  
vans from Arrival



Purchasing 100,000  
electric delivery  
vans from Rivian



100% electric by  
2030



Electrifying entire fleet  
by 2040, including  
7,400 tractors

# Major transit agencies are electrifying their fleets



San Joaquin RTD  
Fully ZEB by  
2025



Los Angeles  
Fully electric by  
2030



California  
Fully ZEB by  
2040



Chicago  
Fully electric by  
2040



Montreal  
Fully electric by  
2040



New Jersey  
Fully ZEB by  
2040



New York City  
Fully electric by  
2040



Seattle  
Fully ZEB by  
2040



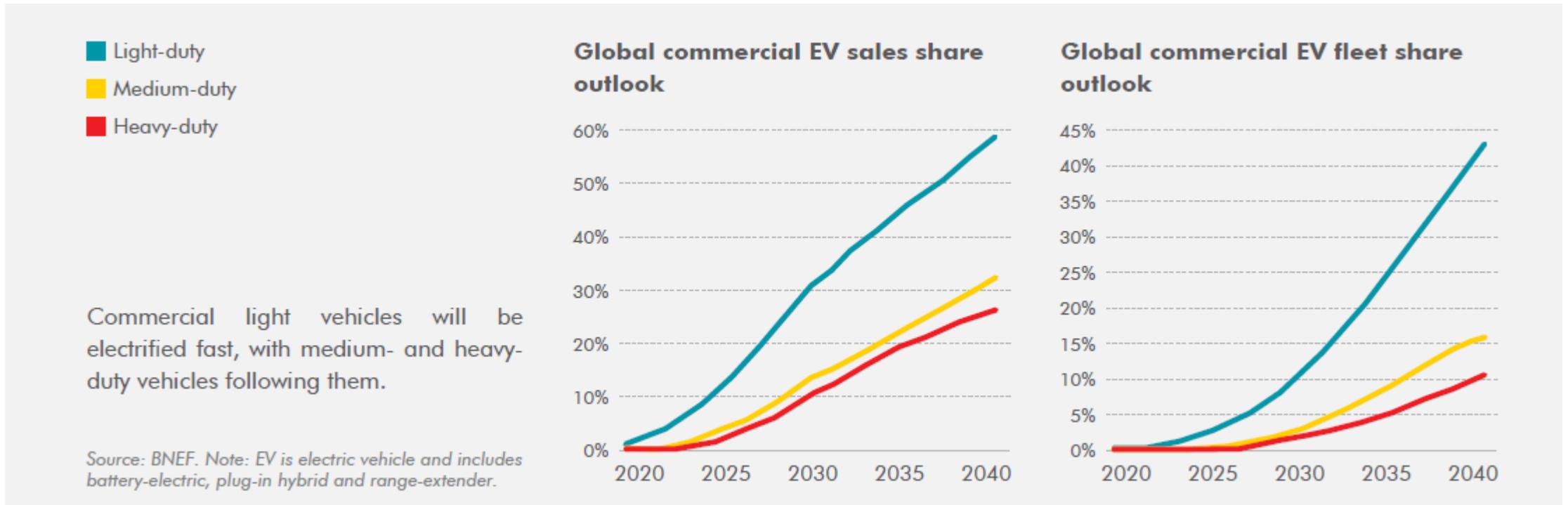
Toronto  
Fully ZEB by  
2045



Washington, D.C.  
Fully ZEB by  
2045

# Commercial EVs are projected to grow significantly

There are **over 1 million commercial EVs** on the roads globally including buses, delivery vans and trucks. Corporate fleet commitments, the rise of e-commerce, urban air quality concerns and growing regulatory pressure will keep the commercial EV market growing in the years ahead.



Data source: Electric Vehicle Outlook 2021, BloombergNEF

# Main themes

- Think holistically
- Plan: plan ahead, and plan for scale
- Leverage software



# Case Study: Volvo LIGHTS



# Case Study: Volvo LIGHTS



**16** Public & private organizations collaborating



**23** Battery Electric Heavy-Duty Trucks



**29** Battery Electric Equipment



**58** Public & Private Chargers



**2** Electric Truck After Market Service Centers



**2** Colleges Designing Electric Truck Maintenance Programs



**1.8** Solar Energy Generation  
million kWh



**2** Ports Providing Infrastructure Planning

# Volvo LIGHTS: Innovative charging solutions



The first heavy-duty fleet charging project to demonstrate the viability of **Class 8 battery electric trucks** and equipment

**3** 150 kW DC Fast Chargers across three trucking facilities

**6** 50 kW DC Fast Chargers across three trucking facilities

**15** Level 2 stations for light-duty vehicles

**50** Electric forklift chargers for in-warehouse operations

## Lessons Learned:

- Many stakeholders: site host fleet, utility, auto OEM (Volvo), hardware manufacturer – integrated PM approach is critical
- Although project is subsidized, it's important to start to analyze path to cost parity with diesel

# Considerations



# Think Holistically

- Electrification is more than just buying vehicles and chargers
- Rethinking operations can yield efficiencies and savings
- Resilience can entail on-site energy solutions
- Reliability requires end-to-end testing, validation and support

# When Planning, Plan Ahead and for Scale

- Plan ahead for electrification at scale
- Energy management is a key operational element
- The utility has a key role throughout the process
- Public funding and incentives can make the difference
- Technology interoperability supports future-proofing and scalability
- Coordinate with local authority having jurisdiction
- Budget plenty of time to allow for unexpected challenges and delays

# Leverage software-based EV charging to manage load

Smart charging enables “set it and forget it” load optimization



## EV Charging Load Sharing

### Benefit:

Eliminate or reduce the need for infrastructure upgrades and install more EV chargers than the site’s transformer capacity would allow

### Working mechanism:

Automatic sharing of available power between EV chargers when charging load is expected to go beyond its limit



## EV Charging Load Scheduling

### Benefit:

Reduce electricity costs by preventing or curtailing charging sessions during hours with high electricity costs

### Working mechanism:

Based on utility tariffs, site hosts can manually set the maximum site load for specific hours during a day when the cost of electricity is high



## Integrated DER & Storage

### Benefit:

Reduce utility bills by pulling energy from the Distributed energy resources (DER), rather than the grid during peak demand charges

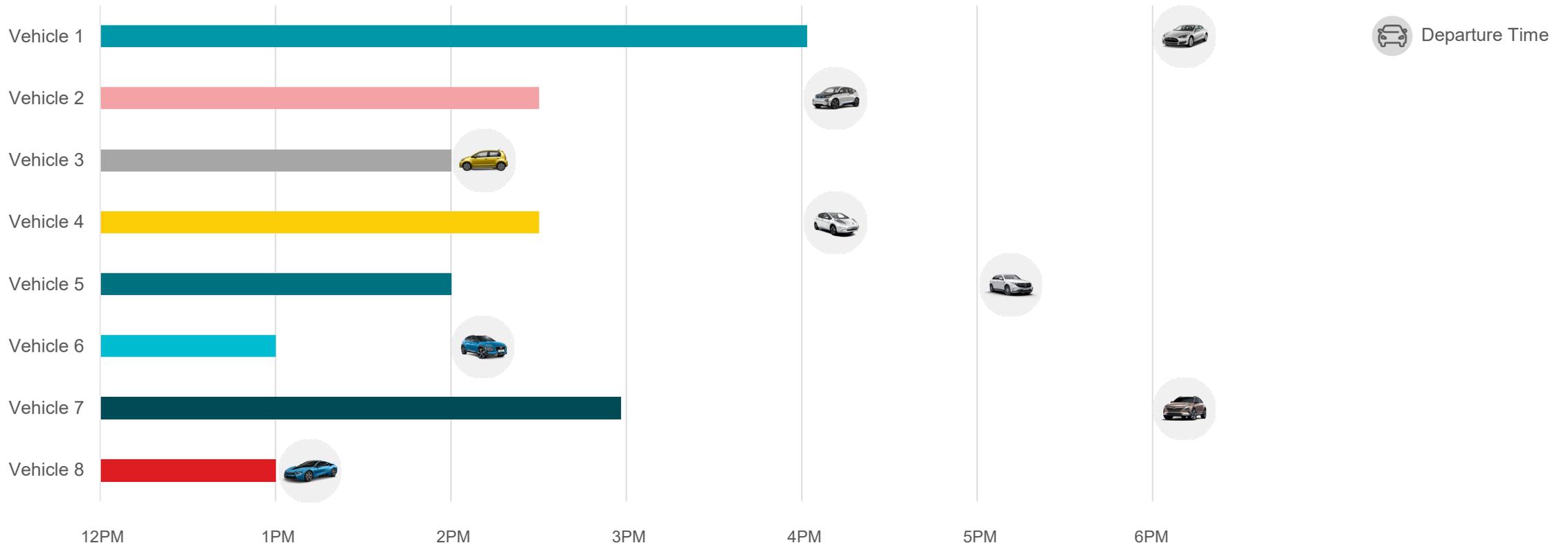
### Working mechanism:

Integrate DER, such as energy storage or solar PV, into EV charging systems

# Example: Non-optimized Fleet Charging

Vehicles start charging as soon as they are connected. Extended periods where vehicles are connected but are not charging

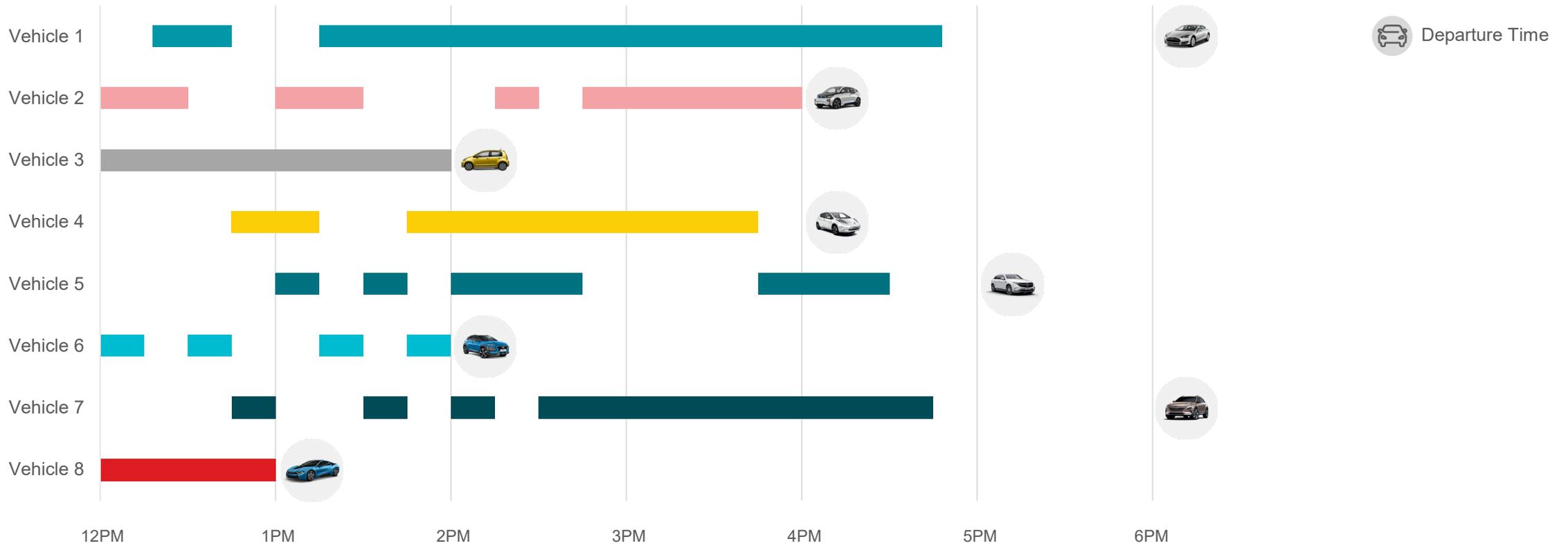
Unmanaged Fleet Charging



# Example: Optimized Fleet Smart Charging

Vehicles don't start charging as soon as they are connected. The load limit and the schedule will determine when the vehicle is to be charged.

Optimized Fleet Smart Charging Schedule

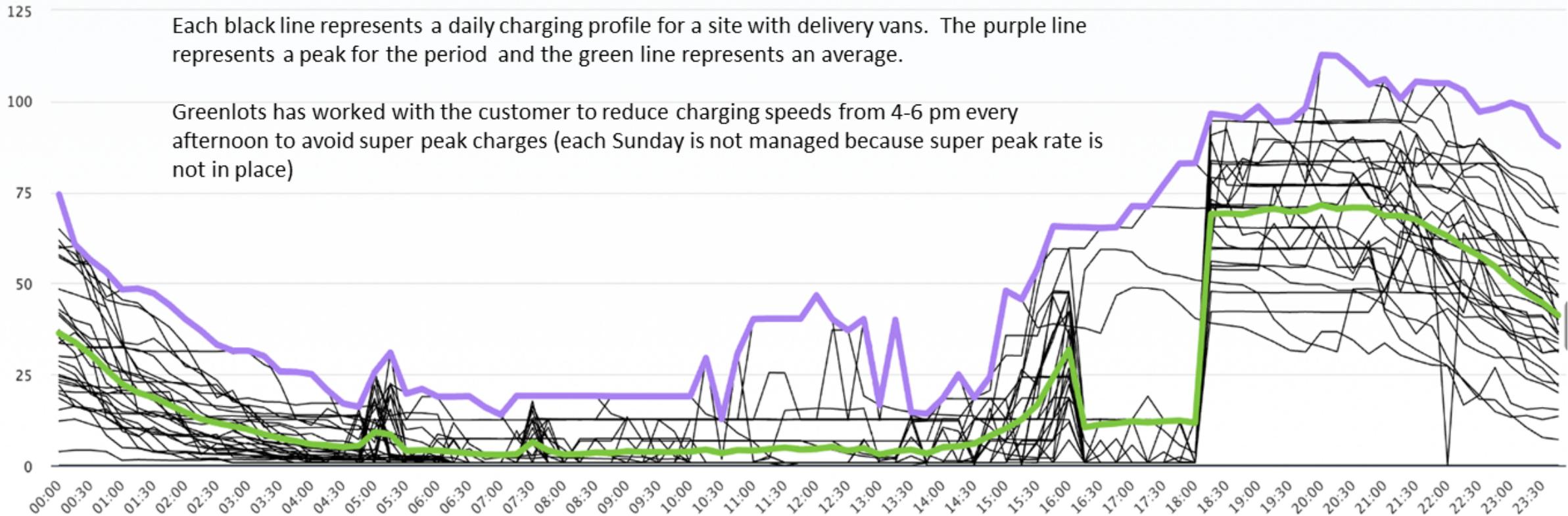


# Case Study: Smart Charge Management

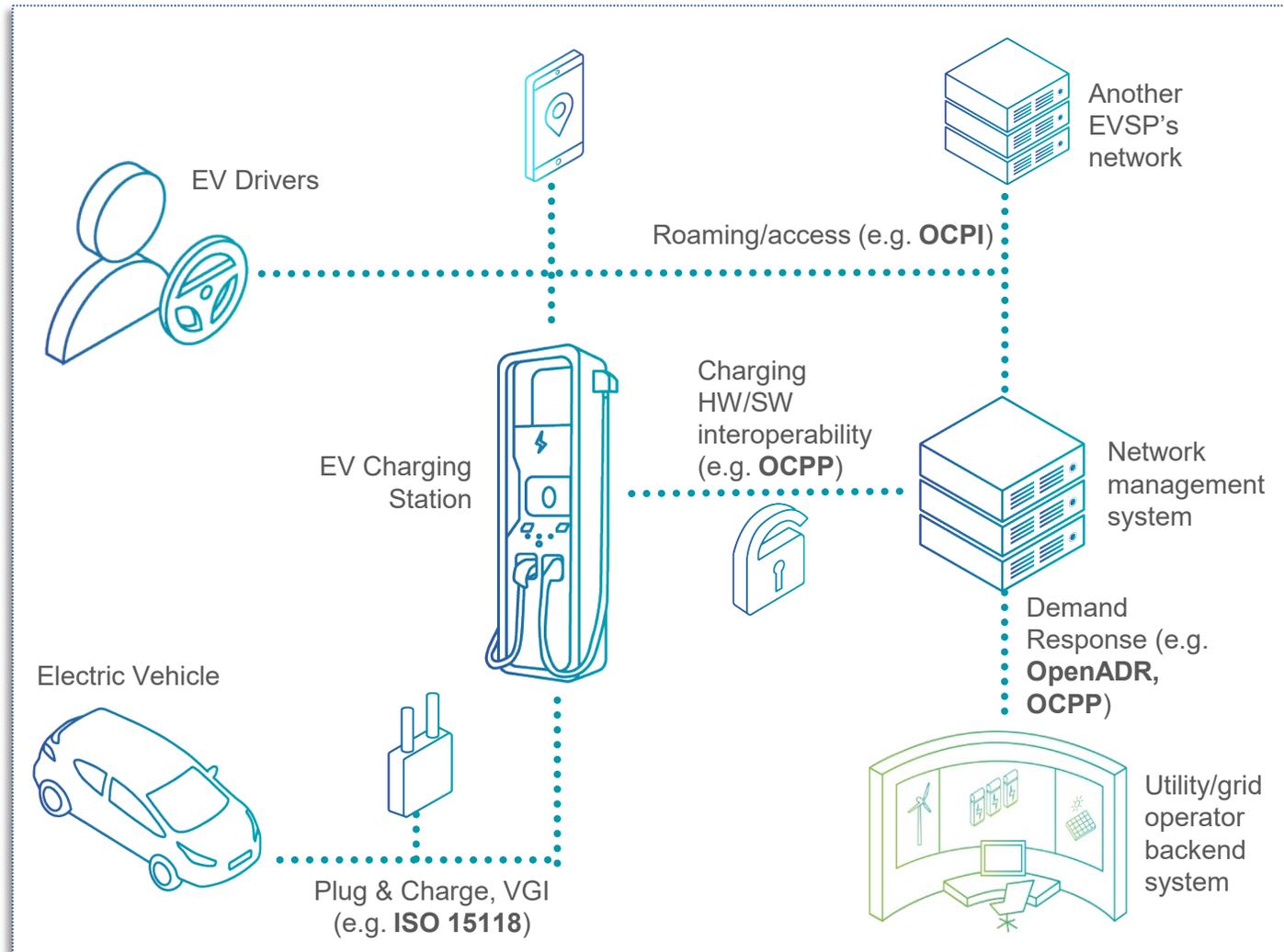
Minimizing charging speeds when utility rates are higher – or to avoid peak rates – while ensuring that fleet vehicles can meet their delivery obligations

2021-02-10 13:35:00 - 2021-03-12 13:34:00

— Daily Load — Average Load — Peak Load



# Open Standards and Protocols Enable a Smart, Flexible & Resilient EV Charging Ecosystem



## OCPP & Open Standards

- Open Charge Point Protocol (OCPP) allows communication between charging stations, a central system, and utilities' IT infrastructure using a single, open and royalty-free protocol
- Required of all Electrify America vendors and increasingly required in utility procurement programs
- Provides foundational capability to connect any central system with any charging station, regardless of the vendor
- Stations work after switching network provider; system works after switching charging stations—no vendor lock-in
- Open standards and protocols more broadly facilitate a seamless driver experience, minimize infrastructure investment risks, support ongoing competition and choice for customers through hardware and software switching capability, and allow for the efficient integration of EVs into the electric grid

# Thank you!

Josh Cohen

Director, Policy

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**greenlots**  
A Member of the Shell Group



# MD/HD Electrification Policies in California

Kinshuk Chatterjee

August 24, 2021



Center for  
Sustainable  
Energy™

# Key State Agencies

- **California Air Resources Board (CARB):** Oversees efforts to reduce air pollution and address climate change.
- **California Energy Commission (CEC):** Funds efforts to research and deploy clean energy and transportation technologies.
- **California Public Utilities Commission (CPUC):** Regulates the investor-owned utilities (IOUs) and authorizes IOUs' transportation electrification programs.



# Key MD/HD Electrification Policies

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## Executive Orders

- **N-79-20 (2020):** 100% of new light-duty vehicles sales must be EVs by 2035; 100% of drayage and off-road vehicles must be ZEVs by 2035; all other MD/HD vehicles must be ZEVs by 2045.
- **B-48-18 (2018):** Deploy 250,000 EV chargers by 2025 and 5 million ZEVs by 2030.

## Legislation

- **SB 350 (2015):** Established a goal of reducing GHG emissions 40% by 2030 (relative to 1990); Authorizes utilities to propose transportation electrification applications with the CPUC.
- **AB 617 (2017):** Directs CARB to support communities most impacted by air pollution.

## Regulations

- **Advanced Clean Trucks:** Require manufacturers to offer increasing numbers of ZEV trucks.
- **Advanced Clean Fleets:** Requires select truck fleets to convert to ZEV vehicles.
- **Innovative Clean Transit Rule:** Requires transit fleets to convert to ZEV vehicles.
- **ZE Airport Shuttle Regulation:** Requires airport shuttle operators to convert to ZEVs.

# Advanced Clean Trucks

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- **Advanced Clean Trucks (ACT)** requires truck manufacturers to sell an increasing percentage of zero-emission trucks beginning in 2024.
  - By 2035, zero-emission trucks would need to comprise:
    - 55% of Class 2b-3 truck sales;
    - 75% of Class 4-8 truck sales; and
    - 40% of truck tractor sales.
  - Reporting requirements – Large employers and fleet operators are required to report information about shipments, shuttle services, and fleet operations.
  - 15 states and D.C. have proposed adopting the ACT.

# Advanced Clean Fleets

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- **Advanced Clean Fleets (ACF)** institutes ZEV purchasing requirements for all public fleets, drayage fleets, and Federal or other high priority private fleets with 50 vehicles or more.
  - Deadlines:
    - From 2024-2026, 50% of new truck purchases must be ZEVs.
    - From 2027 onward, 100% of new purchases must be ZEVs.
  - ACF is scheduled for CARB consideration in December 2021.

# ICT and ZE Airport Shuttles

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- **Innovative Clean Transit Rule (ICT):** Requires transit fleets to convert to zero emission buses (ZEBs).
  - Institutes different requirements for small and large transit fleets.
  - By 2029, 100% of all bus purchases must be ZEBs.
- **Zero-Emission Airport Shuttle Regulation:** Requires shuttle operators in select airports to transition to ZEVs.
  - Timeline:
    - 33% ZEV penetration by 2027.
    - 66% ZEV penetration by 2031.
    - 100% ZEV penetration by 2035.

# California MD/HD Programs

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- **Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP):** Funds point-of-sale vouchers for MD/HD vehicles.
  - Allocated approximately \$160 million for 2021.
- **Energy Infrastructure Incentives for ZE Commercial Vehicles (EnerGIIZE):** Funds MD/HD charging/refueling infrastructure.
  - Allocated \$50 million in initial funding.



# California MD/HD Pilots

- **ZE Drayage Truck and Infrastructure Pilot** – \$44 million, joint agency pilot to deploy 50 Class 8 drayage trucks and supporting infrastructure to electrify port and intermodal travel.
- **Energy Commission Pilots** – Proposed pilots seek to address new technology applications, including bidirectionality, DER integration, and VGI functionality.
- **Utility Pilots** – CPUC has authorized numerous utility MD/HD pilots, including fleet demonstrations, make-ready infrastructure pilots, and port electrification initiatives.

Questions?

# Medium and Heavy Duty Ecosystem

ELECTRIC UTILITIES ROLE

Dawn Neville  
Manager Electric Transportation  
Renewables & Energy Solutions  
August 24, 2021

We have the  
**energy**  
to make things work  
... for you.

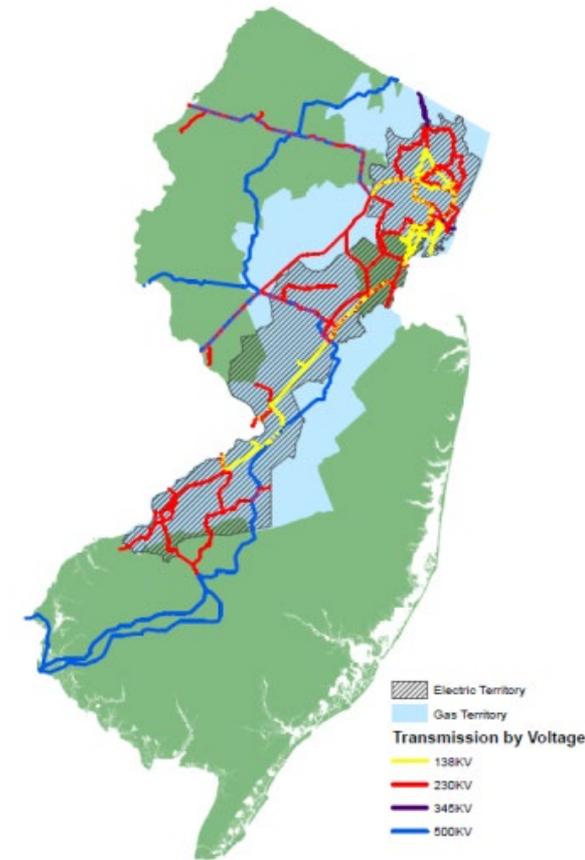


**PSEG**

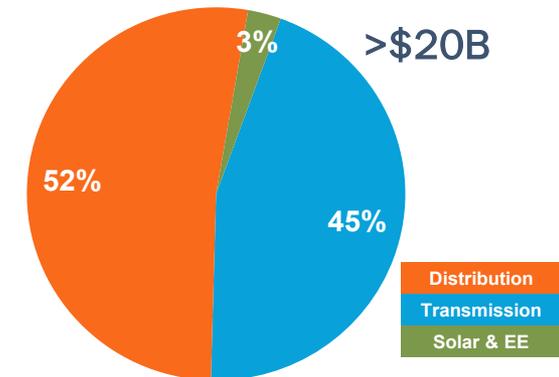
# PSE&G – New Jersey’s largest:

- Electric and Gas Distribution utility
- Transmission business
- Leading investor in renewables and energy efficiency
- Appliance service provider

	Electric	Gas
Customers	2.3 Million	1.9 Million
5-Year Annual Customer Growth*	0.8%	0.7%
2020 Electric and Gas Sales	39,666 GWh	2,370M Therms**
Sales Mix (2020)		
Residential	35%	60%
Commercial	56%	36%
Industrial	9%	4%



**PSE&G 2019 Rate Base\*\*\***



# CEF: Electric Vehicle Program



Investment  
\$166M  
~6-Year Program

Development of smart charging infrastructure to facilitate EV adoption across a broad range of customers and segments

## Subprograms\*

1. Residential Smart Charging
2. Level 2 Mixed-Use Charging
3. Public DC Fast Charging

## Environmental Benefits



an electric mile is  
**70%**  
cleaner than an average mile  
fueled by gasoline

**14**  
million metric tons of CO<sub>2</sub> avoided  
through 2035

## Other Benefits

**270**  
direct clean energy  
jobs

Advances  
NJ clean energy  
and EV goals

Mitigation of  
EV market  
barriers  
&  
reduction in  
range anxiety

\*A 4<sup>th</sup> subprogram, **Vehicle Innovation**, for \$45M investment in medium/heavy duty vehicles (MHDVs), is held in abeyance pending a MHDV stakeholder process

# Why is a Utility Role Appropriate?

- Utility involvement is **appropriate** because
  - Meeting strategic state goals needs cohesive involvement from all stakeholders
  - Utilities have trusted relationships already established with MHD customers
  - The utility has a regulatory obligation to help control costs
  - Existing utility programs for LDVs will help optimize cost effectiveness of developing MHD programs
  
- Electrification **benefits** will extend to
  - PSE&G customers
  - Local communities
  - Those traveling through the state
  - Those residing in neighborhoods most impacted by air pollutants

# Why is a Utility Role Necessary?

- Utility programs are **necessary** to attract private investment
  - Encourage private investment in the NJ market with improved project economics
  - Remove/resolve grid integration barriers to infrastructure investment
  - Utility funding in coordination with other funding (e.g. federal funds) will maximize adoption
- Coordinated utility involvement is **necessary** for managing load growth
  - Very high power charging of MHDVs
  - Concentrated loads associated with fleets
  - Long lead time for building new substations
- Utility involvement **also** helps meet other goals
  - Ensure safety, reliability, and cyber-security
  - Encourage equitable market development
  - Collect and analyze charging data for regulatory analysis, load forecasting, rate considerations, etc.
  - Optimize grid impacts to help control costs for all customers

# Other Utility Considerations

- **Rate design** will be critical for encouraging fleet electrification
  - Electrification “fuel” costs will have a direct impact on fleet operational costs
  - Fleet customers will need to understand demand charges to optimize “fuel” costs
  - Only utilities can address rate design issues
  - Specialized rates will only be effective if lost revenues are captured from the full customer base
- Other **general** considerations
  - Equity goals
  - Strategic electrification opportunities (e.g. NJ Transit)
  - MHD vehicles are in many market segments that do not fit into the ‘One Size Fits All’ category
  - The policy developed through this stakeholder process will need the flexibility to adjust over time to be relevant during the multiple years of this program as the market and technology change

# How to Encourage MHD Adoption

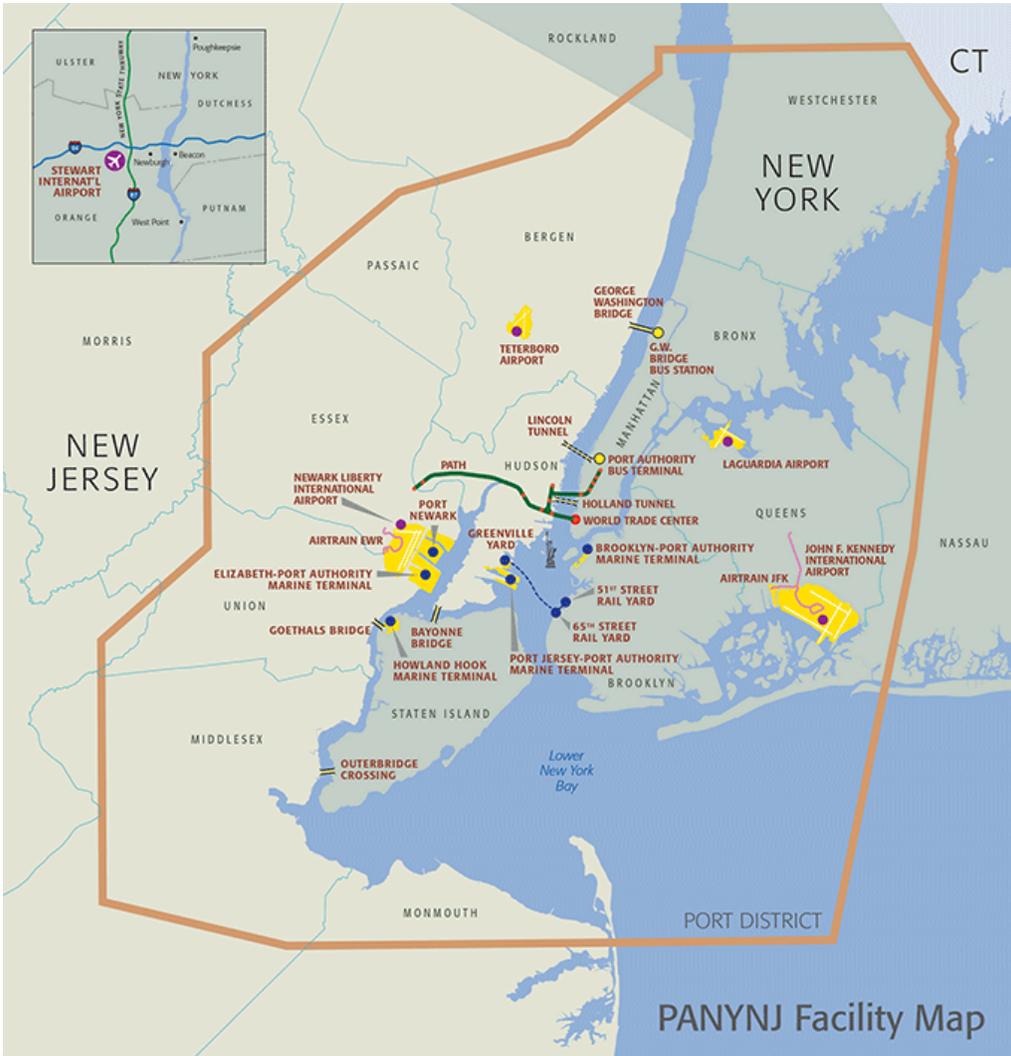
- Offer low cost **make-ready solutions**
  - Make-ready is especially costly for MHDV charging infrastructure
  - Make-ready infrastructure is a natural extension of the utility distribution infrastructure
  - Make-ready build out is a key aspect of grid reinforcement cost control
  - Utility investment can be capitalized long term, thus reducing customer impact
- Fleet owners will rely on **many factors** when deciding to adopt electrification
  - Total cost of ownership and cost per mile calculations
  - Clearly defined and understandable benefits of electrification
  - Utility support to optimize charging design and load factors
  - Integrated Distributed Energy Resources (DERs), such as batteries, to support peak load conditions and provide resiliency
- Solutions are needed for **small fleets** (2 vehicle minimum)
  - Small businesses need utility support to participate and benefit from these programs
  - Overburdened communities have a disproportionate volume of small business needing support

# **Medium & Heavy-Duty Ecosystem**

Port Drayage Trucks: Current State & Challenges

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# Who We Are & What We Control



PANYNJ Facility Map

## Marine Terminals



## Our Sustainability Goals

### Agency-Wide Sustainability Goals

- 35% reduction in Port Authority greenhouse gas emissions by 2025
- 80% reduction in overall greenhouse gas emissions by 2050

### Port Emission Reduction Goals

- Criteria Air Pollutants: 3% annual average decrease
- Greenhouse gas emissions: 5% annual average decrease

### Truck Replacement Program

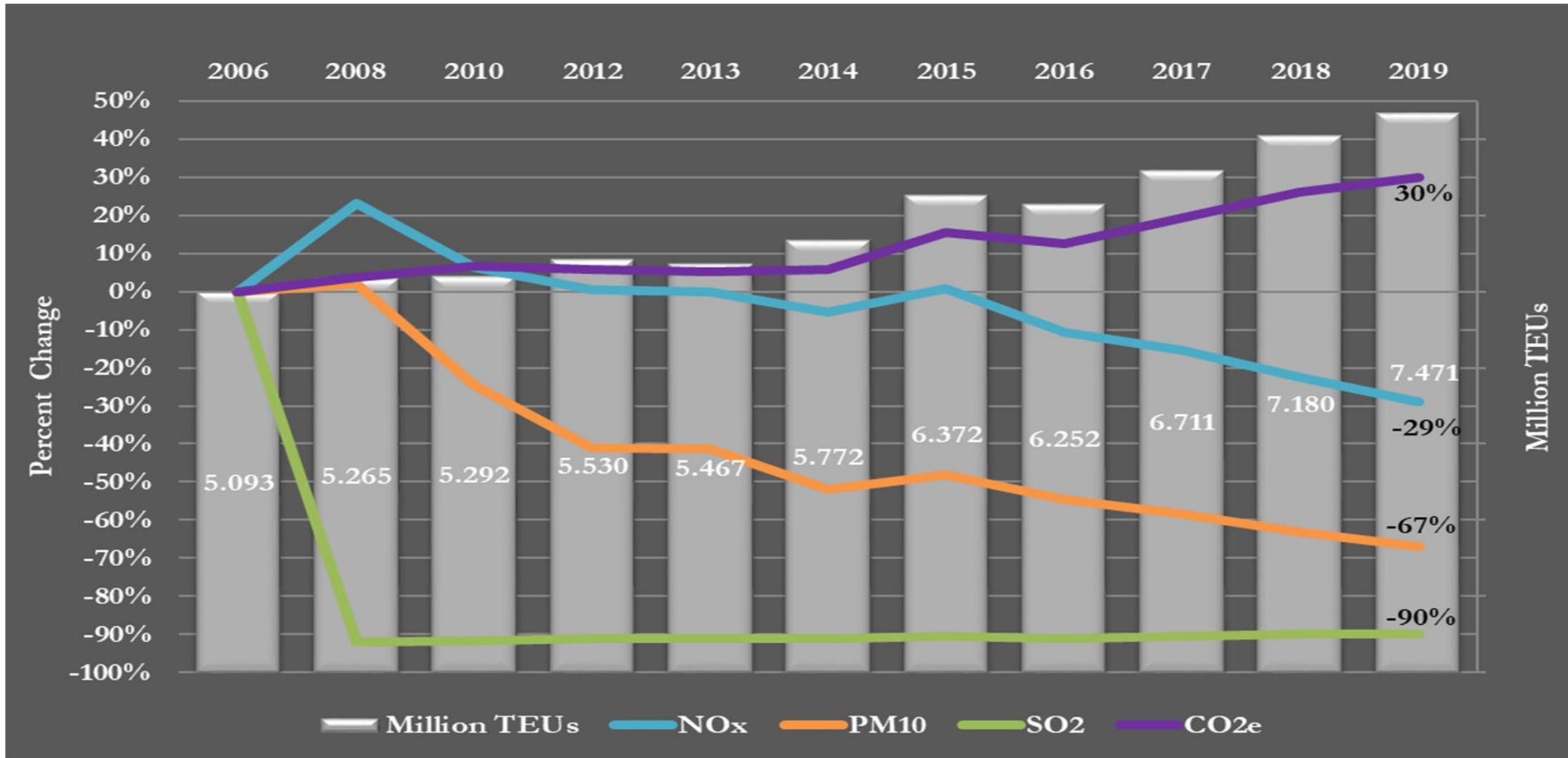


### Cargo Handling Equipment

### Clean Vessel Incentive Program

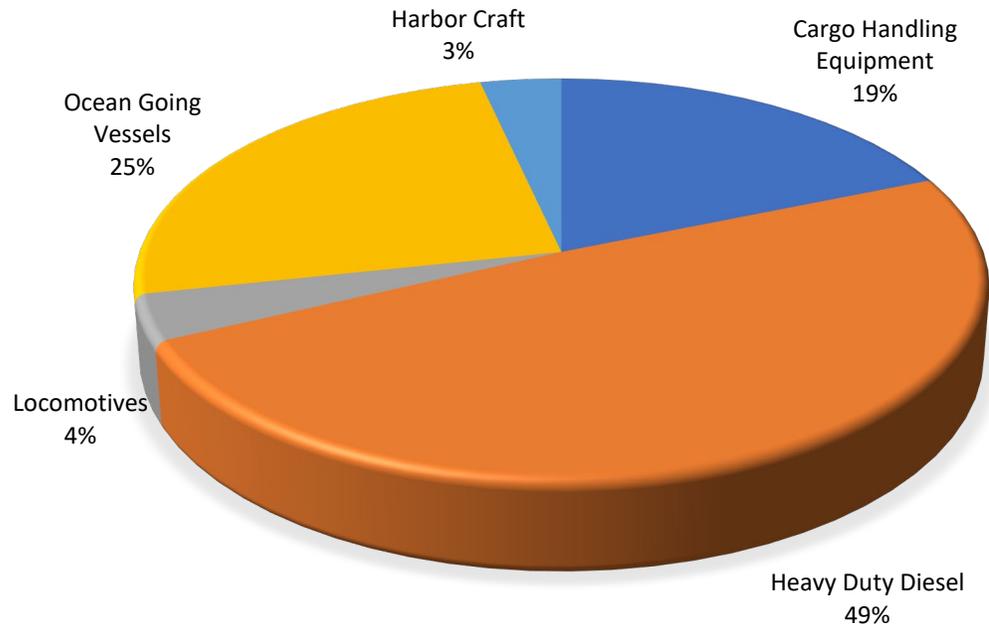


# Heavy Duty Vehicle Emissions Relative to TEU Throughput

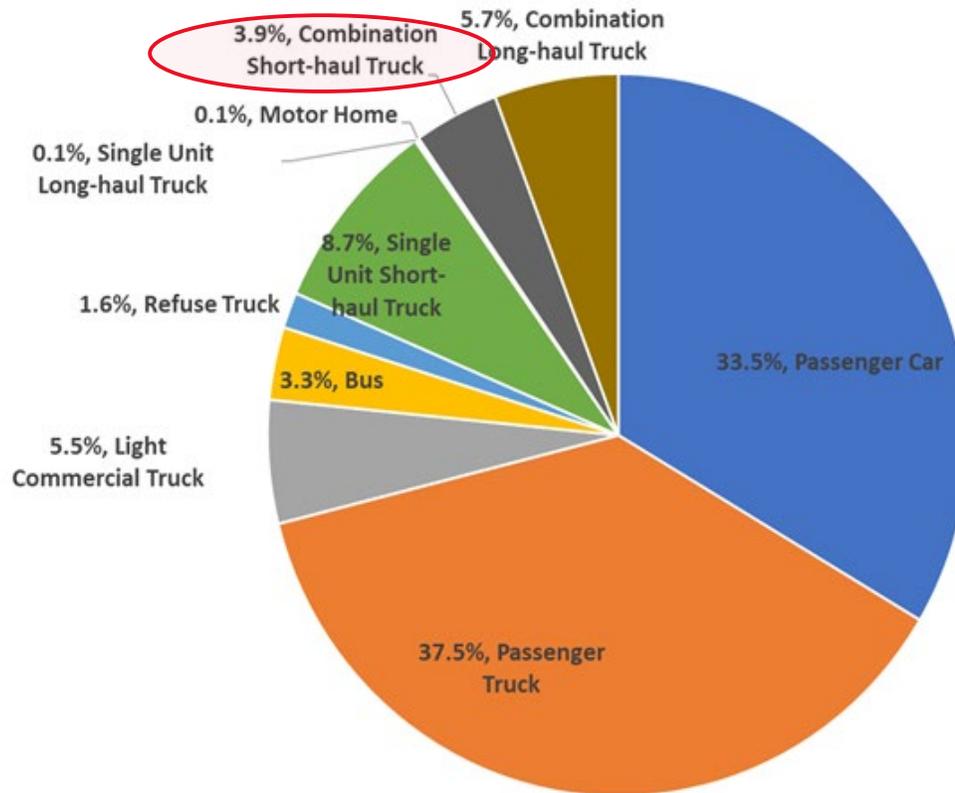


# GHG Emissions

## PORT GHG EMISSIONS BY SOURCE



## Greenhouse Gas Emissions from On Road Vehicles

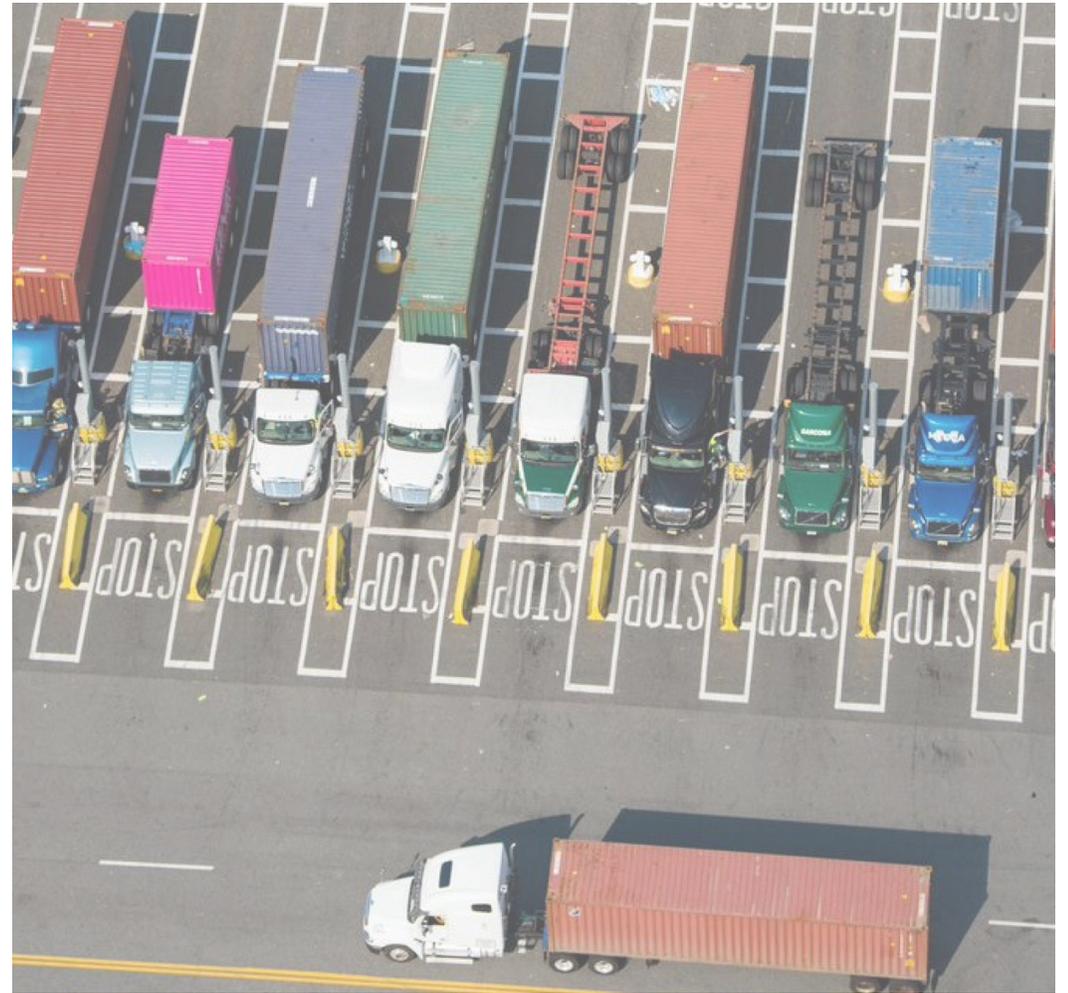


\*NJ Transportation Sector GHG Emission By Source

# Hurdles to Electrification

## Infrastructure Challenges:

- **Current State of the Grid:** substations, access points and future demand points.
- **Lack of Standards:** electrical outlets, charging and fueling and connecting devices.
- **Lack of Charging Stations:** in New Jersey and the broader region.



# Hurdles to Electrification

## Full Scale Commercial Availability:

Make	Model	Powertrain	Availability	Max Range (miles)	Battery Capacity (kWh)	Min Price	Max Price
BYD	8TT	Battery	Available	167	409	\$ 250,000	\$ 300,000
Freightliner (Daimler)	eCascadia	Battery	Late 2021	220	475		
Hyundai	HDC-6 Neptune	Hydrogen	2024		NA		
Kenworth (Paccar)	T680 (H2 - Toyota)	Hydrogen retrofit	Demo	300	NA		
Kenworth (Paccar)	T680E	Battery	Demo	150			
Lion	Lion8	Battery	Demo	250	588	\$ 250,000	\$ 400,000
Nikola	Two	Hydrogen	2023	750	250		
Peterbilt (Paccar)	579EV	Battery	2021	200	420		
Sea Electric	Acco EV	Battery	Demo	155	216		
Tesla	Semi	Battery	2022	500	500	\$ 150,000	\$ 180,000
Volvo Trucks	VNR	Battery	Demo 2021	150	264		
Xos	ET-One	Battery	Demo	150		\$ 180,000	\$ 250,000



Tesla Electric Truck



Freightliner e-Cascadia



Volvo VNR

# Hurdles to Electrification

## Operational Challenges:

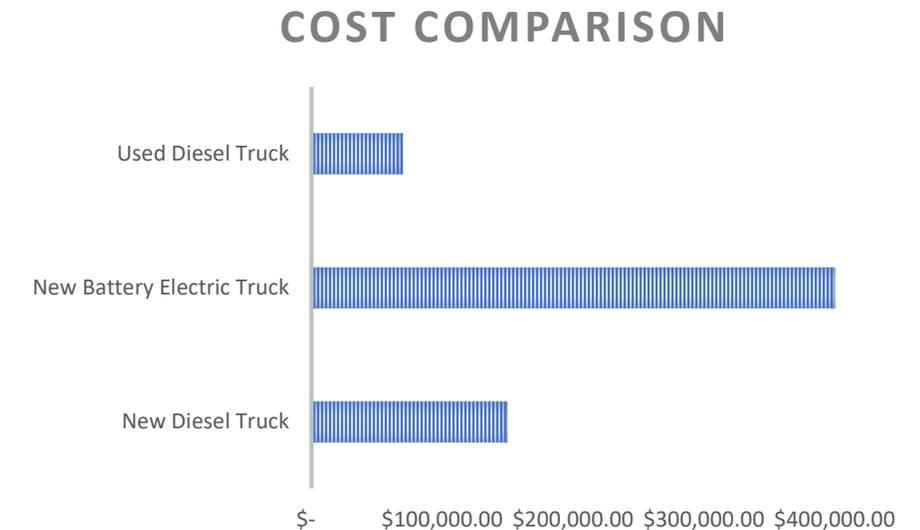
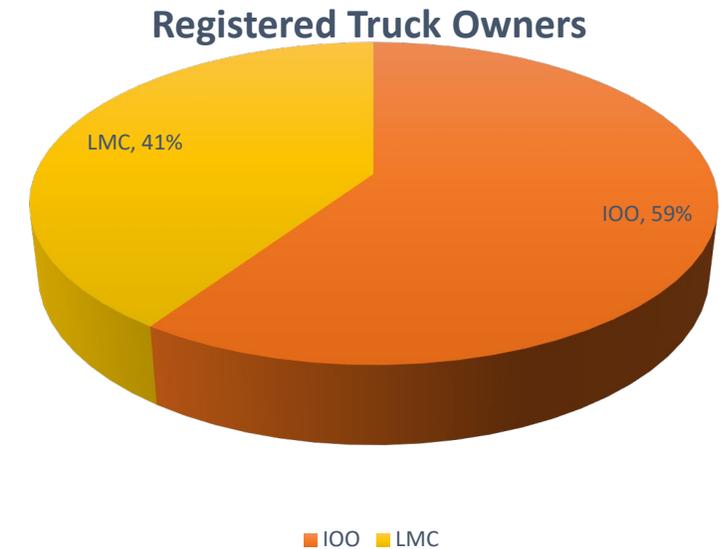
- **Rate & Duration of Charging:** effected by design of the charging station & the state of the batteries.
- **Weight of the Batteries:** likely to impact allowable payload to meet max GVW of 80,000 lbs.
- **Range Limit:** optimal range before needing a recharge is about 100 miles (dependent on temperature, payload, speed, battery condition)
- **Electricity Cost:** charging cost needs to be on par with the cost of diesel.



# Hurdles to Electrification

## Affordability

- > 19,000 trucks registered to service the Port.
- 9,000 unique trucks call the Port each month.
- Approximately 80% of the trucks are owned by Independent Owner Operators (IOOs).
- IOO's typically purchase used trucks
- Class 8 ZE (battery electric) trucks with a charger are expected to cost around \$470,000
  - \*\*\*\* 5-10 times more than a used diesel trucks.
- Hydrogen fueled trucks are expected to be more expensive than a ZEV.
- Limited grant opportunities due to Buy America requirements.



# Next Steps

- Drayage Truck Study to assess feasibility of electrification: currently underway in coordination with NREL
- Data collection for Electrical & Communications Infrastructure Assessment.

## What is needed:

- Infrastructure Grants
- Regulation & Standardization – including Heavy Duty Inspection & Maintenance Regulation, and Emission Standards
- Funding for Pilot Projects & Studies



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# Thank You!

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New Jersey Board of Public Utilities  
I/M/O Medium & Heavy Duty Electric Vehicle  
Straw Proposal  
MHD Ecosystem Stakeholder Panel

Presentation of  
James Sherman, V.P. & Chief Operating Officer  
Climate Change Mitigation Technologies LLC  
August 24, 2021

# Red Hook Container Terminal Ribbon-Cutting



# 10 BYD Heavy-Duty Zero Emission Terminal Tractors



# Red Hook Charging Infrastructure



# BYD On-Road Day Cab Tractor



- Third Generation Technology
- Suitable for Port Dray trucking
- Standard Model (422 kwh) has working range of 125 miles with potential range of 200 miles
- Extended Range Model (566kwh) has working range of 165 miles and potential range of 250 miles
- Top Speed is 74 mph
- Full ADAS

# BYD Garbage Trucks



- Class 6 (10yd<sup>3</sup> capacity)
- Class 8 (25yd<sup>3</sup> capacity)
- Rear-loaders
- Side-loaders
- Roll-off Container
- 22 class 8 garbage trucks on order and/or in delivery

# Lightning eMotors Medium Duty LMD Trucks & Shuttle Buses



# Van Con V2G Type A Zero Emission School Bus



- Van Con Inc., Middlesex NJ
- Since 1973
- First and only V2G Type A school bus in nation
- Body is made in NJ
- Lightning eMotors electric drivetrain and batteries
- 6 buses on order

# Emerging Business Models & Role of Private Companies, the Board, and the Utilities

- Role of Private Industry
- Emerging Business Models
  - Energy and Charging as a Service (ECaaS)
  - Transportation as a Service (TaaS)
- Companies
  - Nuvve
  - Amply
  - Greenlots
  - Viridity
  - Others
- Role of Board and Utilities
- NJBPU: Incentivize V2G
- Utilities:
  - Prioritization of MHD power supply upgrades and V2G interconnections
  - Timely compliance with FERC Order 2222

# Thank You



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