

NARUC Electric Vehicles State Working Group

CURRENT LOOK INTO OEM TRENDS AND PLANNING FOR EVS

MARCH 25, 2024, 3:00 - 4:30 PM ET

Welcome

EV SWG Chair

Commissioner Katherine Peretick, Michigan Public Service Commission

EV SWG Vice Chair

Commissioner Milt Doumit, Washington Utilities and Transportation
Commission

EV Commission Staff Leads

Steve Olea, Arizona Corporate Commission

Benjamin Baker, Maryland Public Service Commission

NARUC Staff

Danielle Sass Byrnett

Agenda

Feel free to enter questions into chat at any time

- | | |
|---------|---|
| 3:00 PM | Welcome and Announcements: Commissioner Peretick <ul style="list-style-type: none">• Agenda review• Announcements |
| 3:10 PM | Speakers: <ul style="list-style-type: none">• Aravind Kailas, PACT, “Working with Electric Utilities to Support Heavy-Duty Electric Vehicles”• Carter Wood, Ford, “Ford’s (Brief) EV and V2X Vision”• Dan Bowerson, Alliance for Automotive Innovation “State of the Light-Duty Vehicle Market” |
| 4:00 PM | Member Discussion |
| 4:30 PM | Adjourn |

EV Fact of the Week:
EVs use approximately 87%–91% of the energy from the battery and regenerative braking to propel the vehicle. Gasoline vehicles only convert about 16–25% of the energy from gasoline into movement (averaging highway and city driving). See [EPA EV Myth Webpage](#).

V O L V O

WORKING WITH ELECTRIC UTILITIES TO SUPPORT HEAVY-DUTY ELECTRIC VEHICLES

NARUC EVSWG

Aravind Kailas, Ph.D.

Volvo Group

2025-03-25

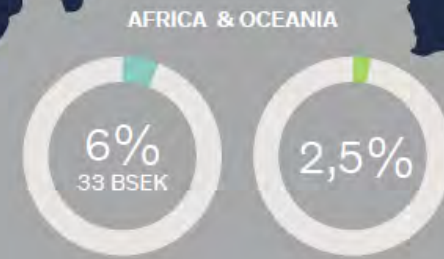
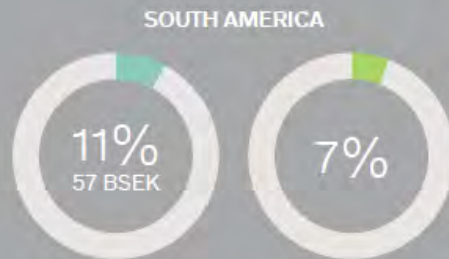
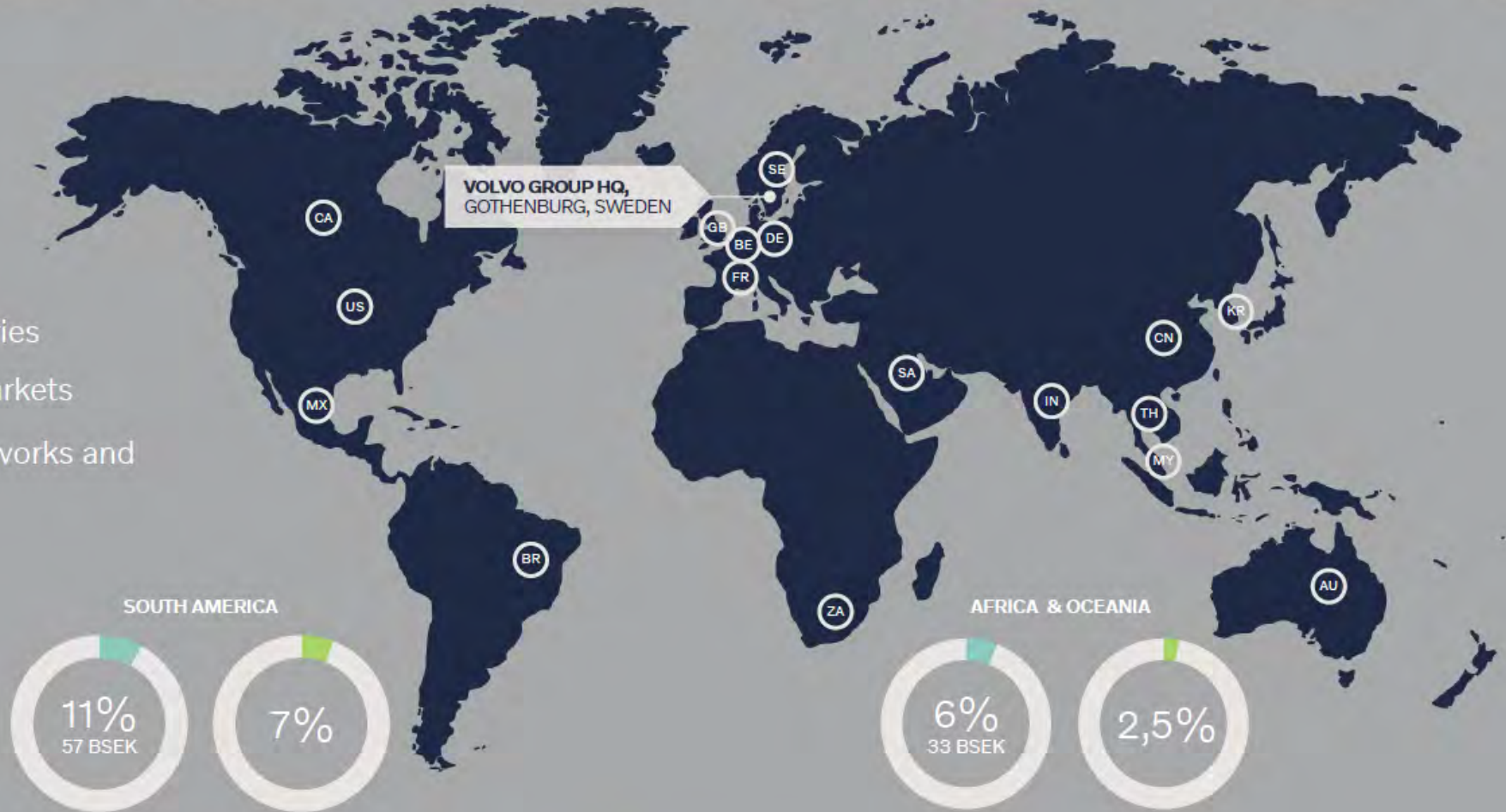
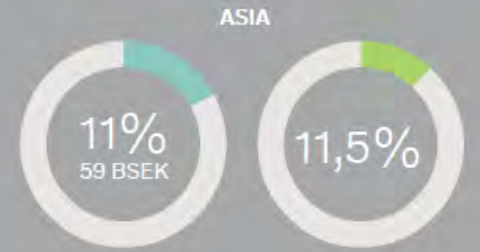
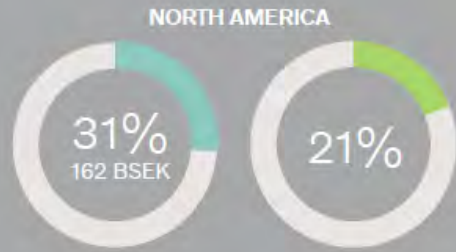
Volvo Group North America

- 16 manufacturing sites
- 9 parts distribution centers
- Global HQ for Mack Trucks



Global presence

- 102,000 employees
- Production in 17 countries
- Sales in almost 180 markets
- Worldwide service networks and dealerships



Our brands

Volvo Group's brand portfolio consists of several distinct brands, targeting a variety of customers and segments.

VOLVO

VOLVO
PENTA

ROKBAK



PREVOST

NOVABUS

MACK



milence 

FLEXIS

 EICHER



cespira

cellcentric

Our unique position in electric mobility

Market leader in Class 8 battery-electric trucks in Europe and North America



VOLVO

8

electric models in
series production



Product Configurations



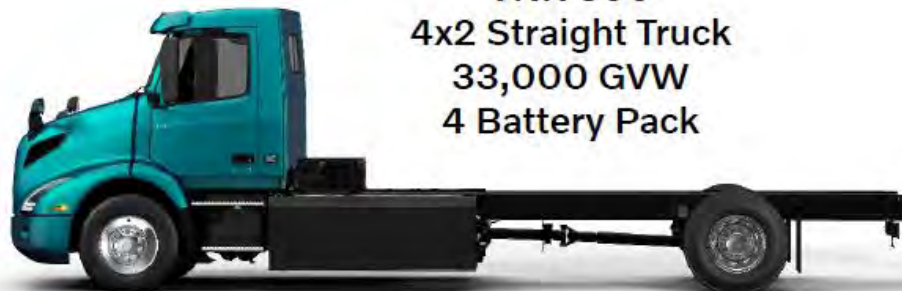
VNR 300
4x2 Tractor
66,000 GCW
4 Battery Pack



VNR 300
6x2 Tractor
82,000 GCW
4 & 6 Battery Pack



VNR 300
6x4 Tractor
82,000 GCW
4 & 6 Battery Pack



VNR 300
4x2 Straight Truck
33,000 GVW
4 Battery Pack



VNR 300
6x4 Straight Truck
54,000 GVW
4 Battery Pack

VNR Electric in Numbers

566

VNR Electric Trucks
Delivered

71

Unique Customers

19

States and
Provinces

7.8 million

Customer Miles
Driven

VNRe Truck Deployments – NA/Canada



2024

62

Volvo Trucks
Certified EV
Dealers

31

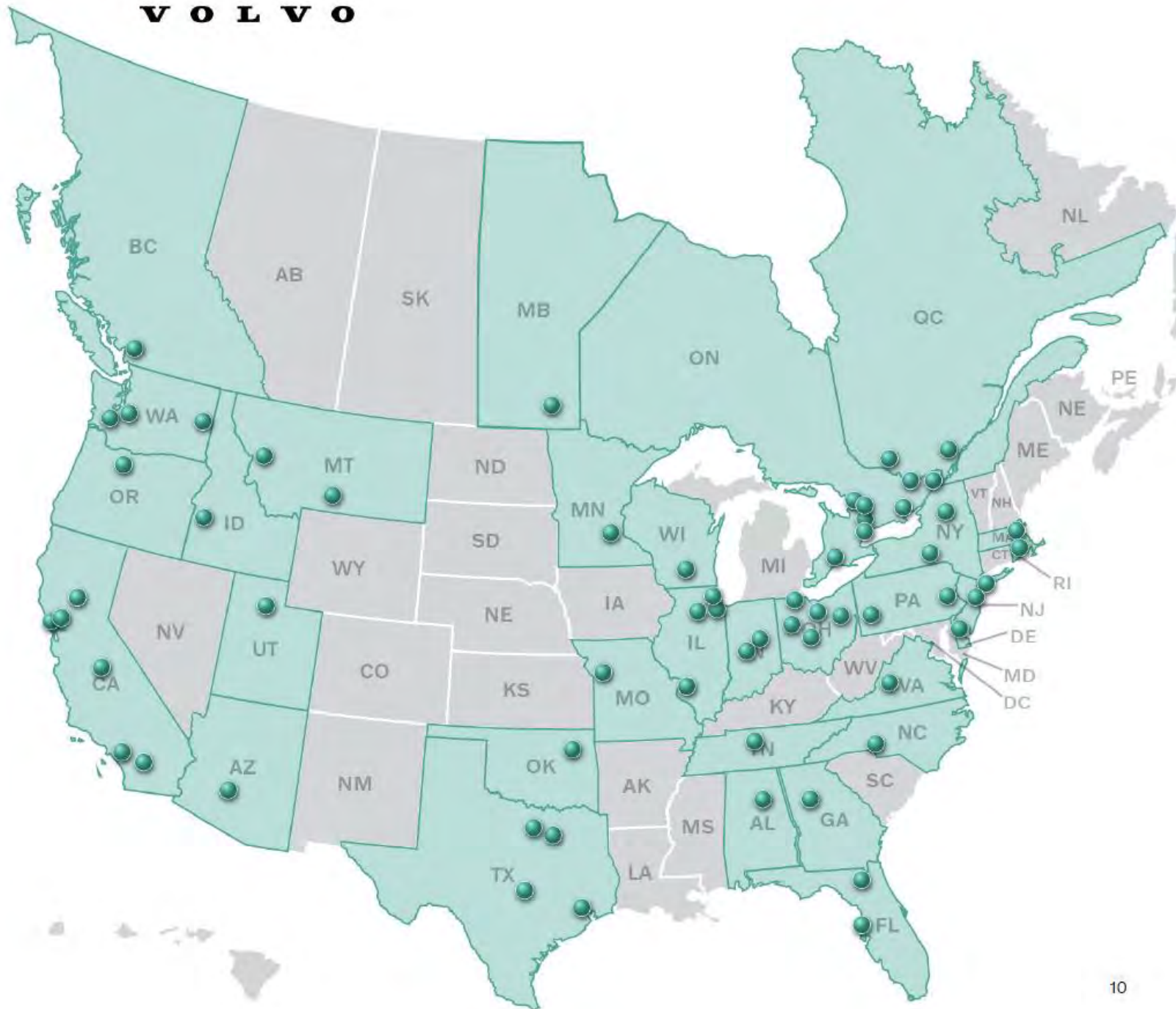
States/
Provinces

40

Dealer
Certifications
in Progress

*Some locations yet to be announced publicly

VOLVO



Mack MD Electric

Horsepower:
260 Peak HP

Torque:
1,850 lbs.-ft. Peak

Battery Capacity:
150kWh (2 batteries)
240kWh (3 batteries)

Max Payload:
19,400 lbs

AC & DC Charging





Mack LR Electric

Horsepower:
536 Peak HP

Torque:
4,051 lbs.-ft. Peak

Battery Capacity:
376kWh (4 batteries)

Max Payload:
25,000 lbs



Mack MD Electric Utility Aerial Lift

Up to 200 miles on a
single charge

Working height of 60 feet
Max side reach of 48 feet

Battery Capacity:
240kW Battery packs
28.8 kWh SmartPTO by Viatec

Material handling
capacity of 2,000 lbs.

Level 2 or DC Fast charging
option (80kW)

Certified EV Dealer Network

66

Mack Trucks Certified
EV Dealers

33

States/Provinces

26

Dealer Certifications
In Progress





PACT

Powering America's Commercial Transportation

The voice for commercial vehicle infrastructure



Members

ABB E-mobility

Alpitronic

amazon

BC Hydro
Power smart

BORGWARNER

**BURNS
MCDONNELL**

CHARGEPLY

CHATEAU
ENERGY SOLUTIONS

Cummins

DAIMLER TRUCK
North America

EAT•N

evrealty

Fortescue.
ZERO

FORUM
MOBILITY

Greenlane

INDUCTEV

INTERNATIONAL

J.B. HUNT

Mortenson

PENSKE

pilot

e-Boost
EV Charging @ the Edge

PITTOHIO
SUPPLY CHAIN • LTL • TL

PROLOGIS
MOBILITY

Terawatt

truCurrent

voltera

VOLVO

Walmart

Zeem

Why PACT?

Demand for electric M/HD technologies will grow as more infrastructure becomes available.

Growing demand requires collaboration. PACT brings together vehicle makers, fleet operators, charging companies, utilities and commissioners, and policymakers to work together and find solutions.



Our Vision

A robust market for all types of commercial vehicles, providing M/HD electric fleets with access to reliable power when it's needed, where it's needed, and at a reasonable cost.



Breaking Down Barriers, Accelerating the Transition

Barriers

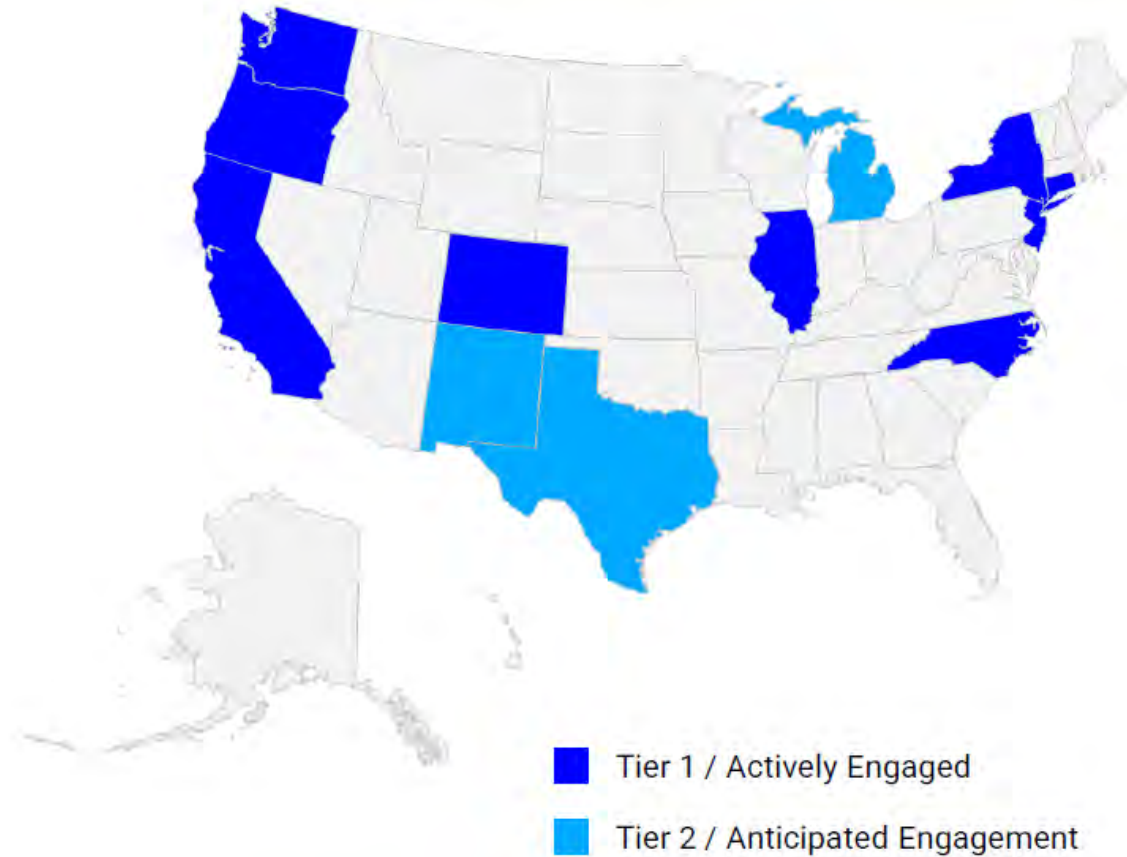
- M/HD fleet electrification imposes significant upfront costs on all project stakeholders
- Complex application processes and permitting regulations often delay project timelines
- Outside the trucking sector, limited knowledge of unique M/HD charging needs

Solutions

- Dedicated federal & state funding streams for M/HD infrastructure
- Expedited and streamlined permitting & approval processes and proactive grid build outs
- Deep and consistent collaboration between energy, trucking and public sectors

Where are we focused?

Guided by input collected through member surveys and policy deep dive discussions, PACT has been working nationally and at the state-level.



Policy Priorities

- Standing up an enabling market for the growth of electric commercial vehicle adoption
- Readyng the grid for today's advanced vehicle technologies
- Making the energy transition a win-win for all



Guiding Principles

- Advocate for federal, state, and local policies and programs that increase and accelerate the deployment of M/HD commercial vehicle infrastructure.
- Advocate for effective utility policies to support the build out of M/HD electric vehicle infrastructure.
- Proactively pursue collaboration, outreach, and education with stakeholders.



There's no such thing as an "average" M/HD truck.

- Vehicles are designed and manufactured according to customers' functional specifications
- Distinct duty cycles have different charging requirements
- Unique charging requirements elicit dedicated tariff structures, reasonable rates, and flexible incentive programs

Class Six: 19,501 to 26,000 lbs.



Beverage



Rack



School Bus



Single Axle Van



Stake Body

Class Seven: 26,001 to 33,000 lbs.



City Transit Bus



Furniture



High Profile Semi



Home Fuel



Medium Semi Tractor



Refuse



Tow

Class Eight: 33,001 lbs. and over



Cement Mixer



Dump



Fire Truck



Fuel



Heavy Semi Tractor



Refrigerated Van



Semi Sleeper



Tour Bus

Product (Vehicle) Development

Diesel

- Driven by customers' needs
- Do it all
- Significant leaps vs. Incremental improvements
- Focus on efficiency
- Consultation with customers
- Established ecosystem

Electric

- Driven by incentives and policies
- Purpose built
- Focus on battery capacity, range, weight reduction, charging
- Novel designs, integrating batteries and new electric motors
- Emerging ecosystem

New Technology, New Challenges

Diesel

- Building on existing technologies
- Refueling networks are well-established, easily accessible, and cost-competitive
- High utilization

Electric

- New supply chains
- Unprecedented reliance on third parties
 - Utilities
 - Grants and incentives
 - Permitting

What's a duty cycle and why does it matter?

How and how much a vehicle is used, factoring in speed, payload, driving patterns, distance and downtime

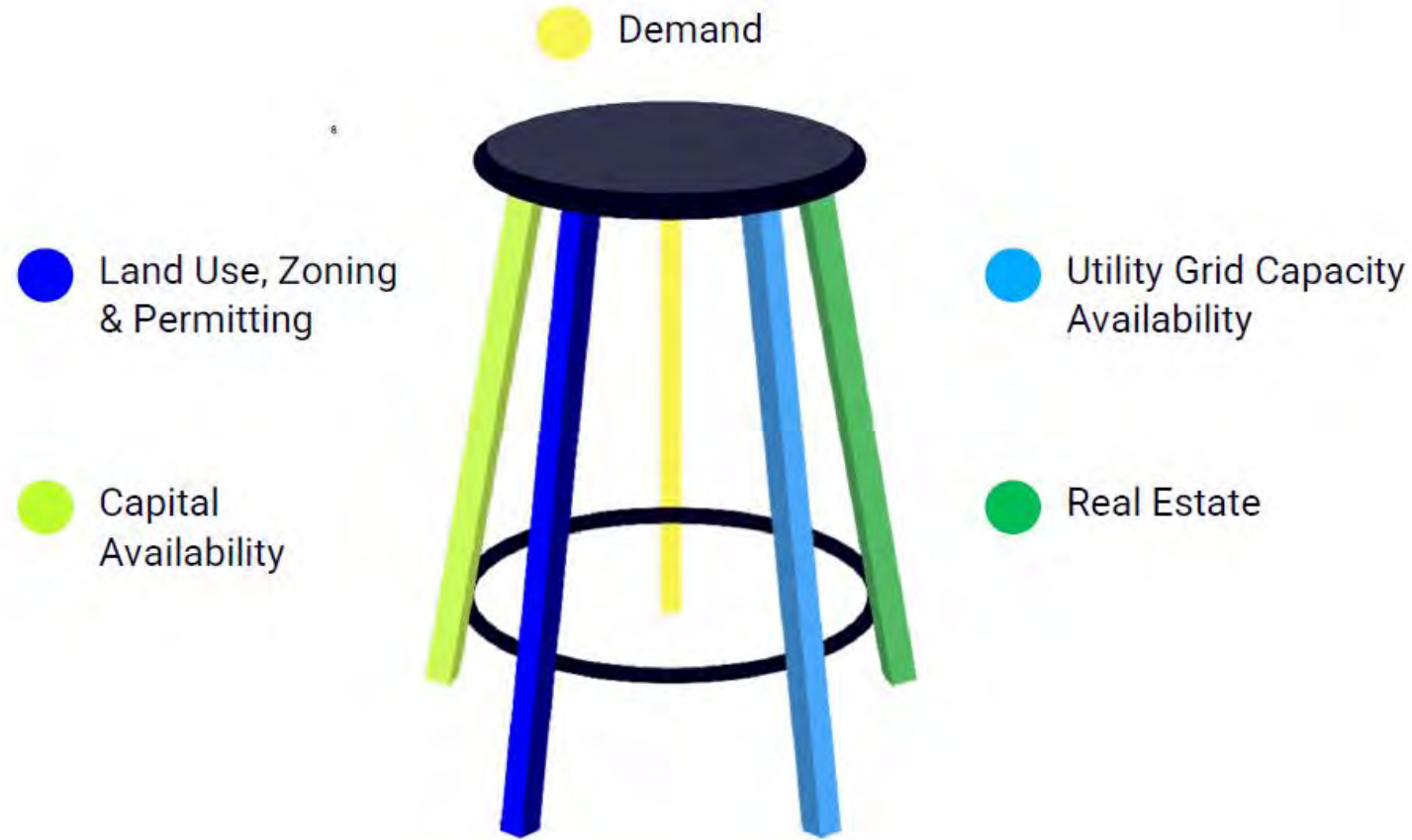
Drayage/Middle Mile

- Haul containers to and from shipping ports and logistics hubs
- Travel short distances, start and stop frequently
- Requires fast charging in real estate and power constrained areas
- Public or shared depots

Long-Haul

- Interstate freight transport
- Travel far distances (100,000+ miles/year) at sustained highway speeds (50–65 mph)
- Requires ultra-fast charging along highways
- Public depots
- Need for Megawatt Charging System (MCS)

Pathways to Market Transformation for MHDVs



Developing charging infrastructure is time intensive, costly, and complex

- Requires careful consideration for location, size, power availability and constructability.
- Clear and reliable energization timelines are critical to support private sector investments.
- Project development and operations hinge on getting power to a site.

Public Charging

- **Users:** Local, regional and long haul freight operators; first/last mile delivery and distribution; small business operators; rented or short-term leased trucks; construction vehicles; corporate or commercial entities
- **Average Size:** 2-5 acres; up to 10+ acres
- **Charger Reqs:** 350kW - 1 MW DC fast chargers
- **Power Reqs:** 10- 100 MW
- **Design Reqs:** Pull-thru lanes, amenities store, crosswalks
- **Benefits:** Move beyond return to base operations, support electrification without upfront costs



Shared or Multi-Fleet

- **Users:** Drayage, short-haul, first/last mile delivery, municipal, rideshare, taxis and rental car companies, shipping and logistics, utility and service vehicles, corporate or commercial
- **Average Size:** 3-5 acres
- **Charger Reqs:** 7-42 x 350kW DC fast chargers
- **Power Reqs:** 5-15 MW
- **Design Reqs:**
- **Benefits:** Higher utilization, charger availability certainty, control and security



Private Charging

- **Users:** Shippers, producers and sellers of goods and services; often have bespoke needs, depend on fast and reliable charging
- **Average Size:** 1.85 acres
- **Charger Reqs:** 65 x 180 kW
- **Power Reqs:** 7-11 MW
- **Design Reqs:** Driver lounges
- **Benefits:** Greater certainty and control over operations



Funding Implications of Delayed Timelines

- Grant funding reduces capex and defrays investment risk in the early years while utilization is still low
- Hundreds of millions of local, state and federal dollars have been awarded to M/HD projects; each grant contract stipulates a strict *liquidation deadline* of when funds must be spent
 - Federal grants up to 5 years on average
 - State grants 2-3 years on average
- Utility energization timelines are often much longer than grant liquidation deadlines
- Energization delays jeopardize grant funding and development feasibility, particularly early on when truck volumes are low

Wider use of bridging solutions needed soon

- Industry needs Bridging Solutions to work, especially in the next few years when grid capacity availability is tight.
- Many are common utility practices that do not require regulatory approvals. Once the regular grid capacity addition is energized, bridging solutions can drop off.
 - Shifting loads from a feeder to another nearby feeder
 - Temporary power to get started
 - Flexible Service Connections
 - Ramped/Phased connections
 - Timed/Scheduled connections
 - Increased use of utility-owned portable transformers/substations, battery storage
- If utilities struggle to meet our timelines, we are willing to pursue “customer-owned” BTM microgrids, using on-site generation & battery storage not connected to the utility grid.

V O L V O

THANK YOU!

Ford's (Brief) EV and V2X Vision

NARUC EVSWG

March 25, 2025

Carter Wood

Electrification Policy SME

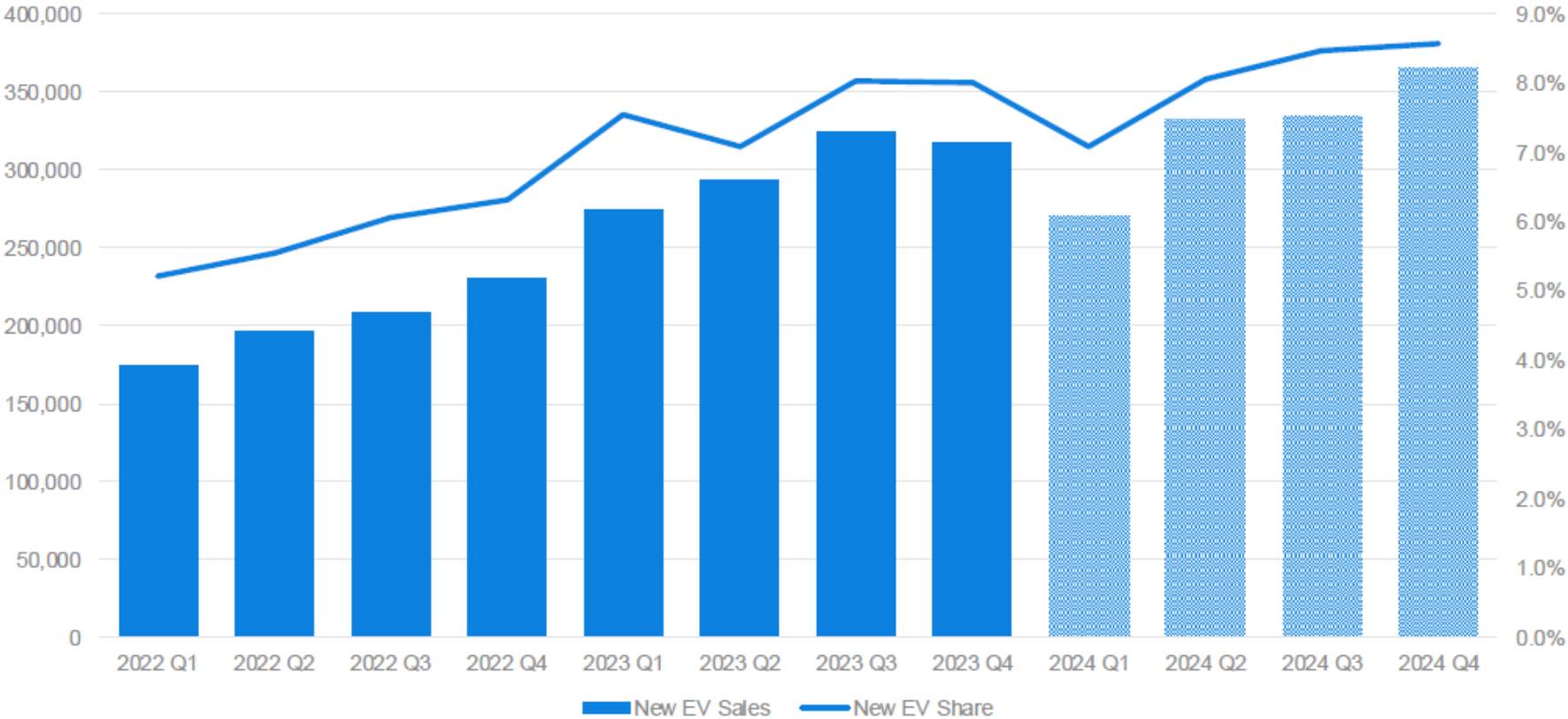


Electrifying Our 'Crown Jewels'



New Electric Vehicle Sales | 2024 Another Record Year

1.3M vehicles were sold, with Tesla's market share dipping below 50% for the first time.



Top 10 Brands in New EV Market Share

Make	EV Share
Tesla	49.5%
Ford	6.8%
Hyundai	4.8%
Chevrolet	4.5%
Kia	4.4%
BMW	4.0%
Rivian	3.6%
Cadillac	3.3%
Nissan	2.4%
Mercedes-Benz	2.4%

Source: Cox Automotive
 Alliance for Transportation Electrification Presentation
 March, 2025

Value Beyond Mobility



At Ford, we believe EVs should be part of the solution and not the problem.

From Backup Power to V2G.

**Backup Power
(Islanded)**



Requirements

Only allowed to operate when disconnected from the grid. Operates like a traditional gas/diesel generator.

**Vehicle-to-Home
(V2H)
Grid-Connected,
Non-Export**



Vehicle energy discharged must match home load. Requires utility non-export interconnection permission to operate (PTO) in parallel to grid.

**Vehicle-to-Grid
(V2G)
Grid-Connected,
Export**



Requires utility interconnection permission to operate (PTO) and export into the grid.

Bidirectional functionality comes in multiple forms.

Ford's Bidirectional (V2X) System

Key Components.

- Ford F-150 Lightning – **1st retail-production electric truck with bidirectional capabilities!**
- Ford's V2X System includes 3 main components:
 - 1) Ford F-150 Lightning
 - 2) Ford Charge Station Pro (EVSE)
 - 3) Ford/Sunrun Home Integration System (HIS)
 - Includes Microgrid Interconnection Device (MID), inverter and dark-start battery



Ford's System has already been rolled out and operational in all 50 states and >100 utilities.

Michigan Public Service Commission (MPSC) Declaratory Filing

Purpose and Goals

- 1) Be a proactive partner and work collaboratively with regulators and utilities
- 2) Stakeholder engagement with key parties: DTE, Consumers, MEGA utilities, co-ops, Commission staff, MEIBC and VGIC
- 3) 41-page filing including testimony from Ford expert witnesses



Gretchen Whitmer, Governor
 Dan Scripps, Chair
 Katherine Peretick, Commissioner
 Alessandra Carreon, Commissioner

NEWS RELEASE

X/Twitter: [@MichiganPSC](https://twitter.com/MichiganPSC)
www.michigan.gov/mpsc

FOR IMMEDIATE RELEASE March 13, 2025
News media contact: [Matt Helms](mailto:Matt.Helms@mpsc.michigan.gov) 517-284-8300
Customer Assistance: 800-292-9555

MPSC takes action to strengthen power grid and maximize customer value from distributed energy resources

Orders across a range of proceedings highlight efforts to modernize Michigan's regulatory framework

REQUEST FOR DECLARATORY RULING

Pursuant to Section 63 of the Michigan Administrative Procedures Act, 1969 PA 306, MCL 24.263, and Michigan Public Service Commission (“the Commission”) Rule 448 (R 792.10448), Ford Motor Company (“Ford” or “the Company”) requests a declaratory ruling interpreting Michigan’s Interconnection and Distributed Generation Standards (“MIXDG”), R 460.901a *et seq.* as inapplicable to systems with backup power capabilities, such as the Ford Home Backup Power (“HBP”) System (“System”), and thus finding that Systems with HBP capabilities do not require interconnection authorization from the electric utility.



Ford

How can we lead on interconnection solutions for bidirectional vehicles?



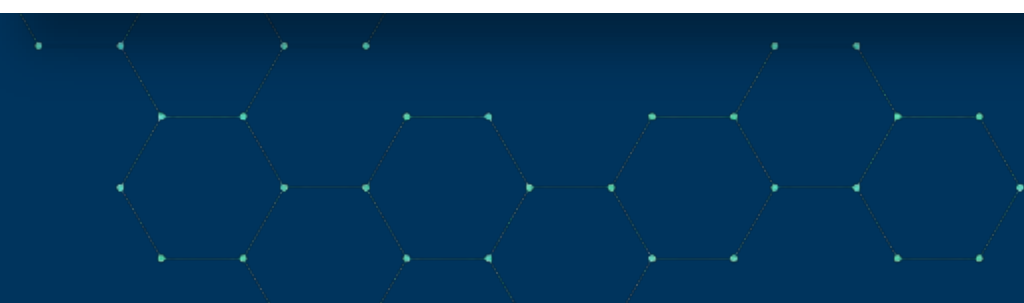
ALLIANCE
FOR AUTOMOTIVE
INNOVATION



NARUC EV Working Group – State of the Light-Duty Vehicle Market

Dan Bowerson – Vice President, Energy & Environment Policy

March 25, 2025





• APTIV •



Autoliv

• BASF
We create chemistry

BMW GROUP

BOSCH

DENSO



HONDA

HYUNDAI

INEOS
Automotive

infineon

ISUZU



KIA



LUMINAR

MAGNA



McLaren

Mercedes-Benz



nuro

Panasonic

PORSCHE

Qualcomm

RV
INDUSTRY
ASSOCIATION

SAMSUNG
SAMSUNG SDI

SiriusXM
CONNECTED VEHICLE SERVICES



STELLANTIS



TEXAS
INSTRUMENTS

TOYOTA

Uber

VINFAST

VOLKSWAGEN
GROUP OF AMERICA

VOLVO

ZOOX

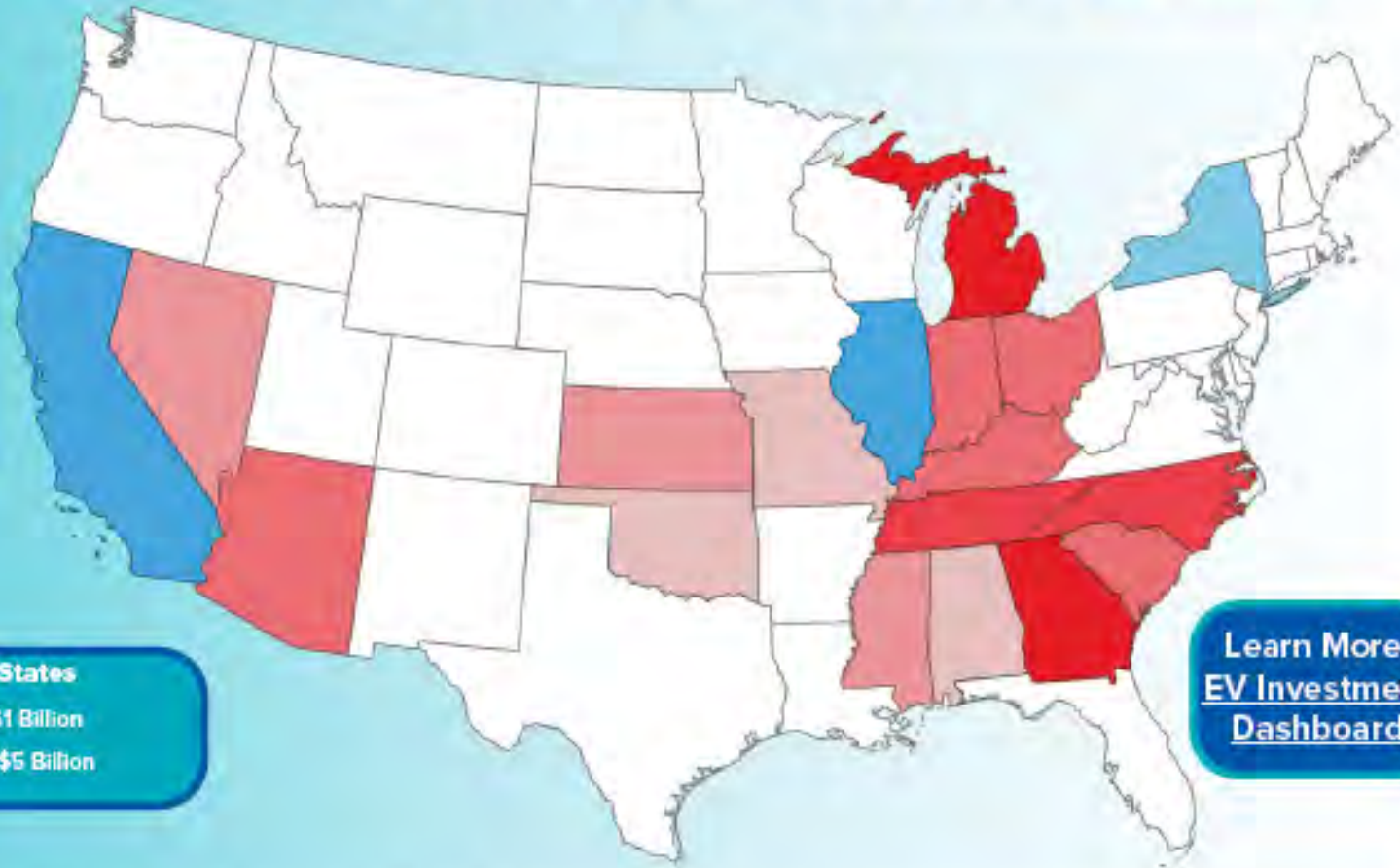


State of the Industry

AUTOMOTIVE MANUFACTURING: INVESTING IN THE FUTURE (2018 - SEPT. 2024)



Key tax provisions (including 30D, 45W, 45X) support a **SHARED** objective: a globally competitive American auto industry that underpins the country's economic and national security interests.



Red States

- Less than \$1 Billion
- \$1 Billion - \$5 Billion
- \$5 Billion - \$10 Billion
- \$10 Billion - \$20 Billion
- More than \$20 Billion

Blue States

- Less than \$1 Billion
- \$1 Billion - \$5 Billion

Learn More:
[EV Investment Dashboard](#)

Source: Compiled from company reports, press statements, and other media related to EV and battery investments.

PRIVATE SECTOR INVESTMENTS BY THE NUMBERS (2018 - 2024)

\$91 BILLION
BATTERY FACILITIES

\$38 BILLION
EV FACILITIES

\$129 BILLION*
TOTAL INVESTMENTS

Q4 2024 EV Highlights



EV MODEL AVAILABILITY

144 Types of Vehicle Models Sold in Q4 2024

83 Battery Electric Vehicles

21 Cars

47 Utility Vehicles

6 Pickups

9 Vans

58 Plug-in Hybrid Vehicles

25 Cars

32 Utility Vehicles

1 Van

3 Fuel Cell Electric Vehicles*

1 Car

2 Utility Vehicle

**Includes Plug-in Hybrid Fuel Cell*

Key Facts

433,843 EVs sold

10.9% of light-duty sales were EVs

- Highest quarter on record

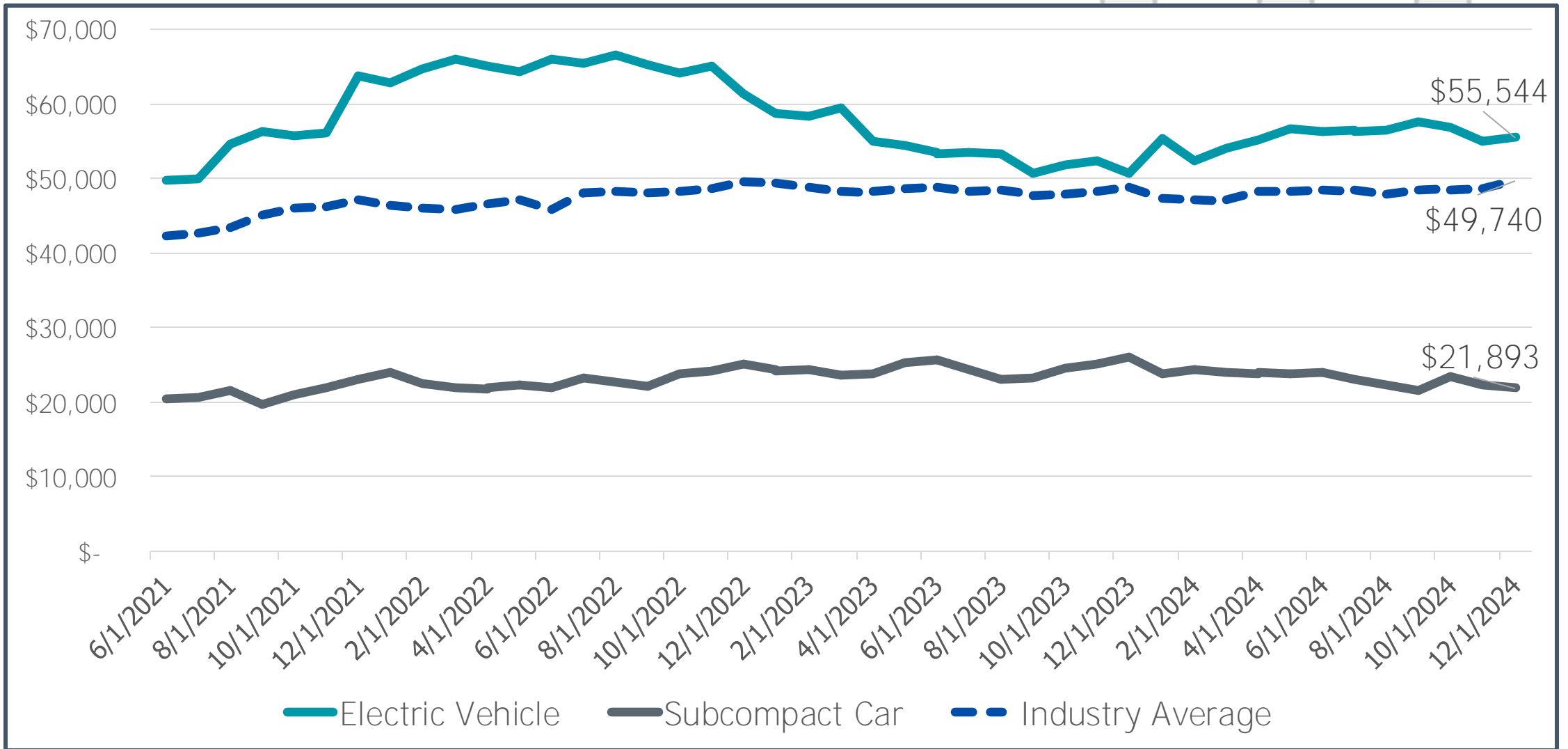
0.3 percentage point market share increase over Q3 2024

- Increase of about 24,000 vehicle sales

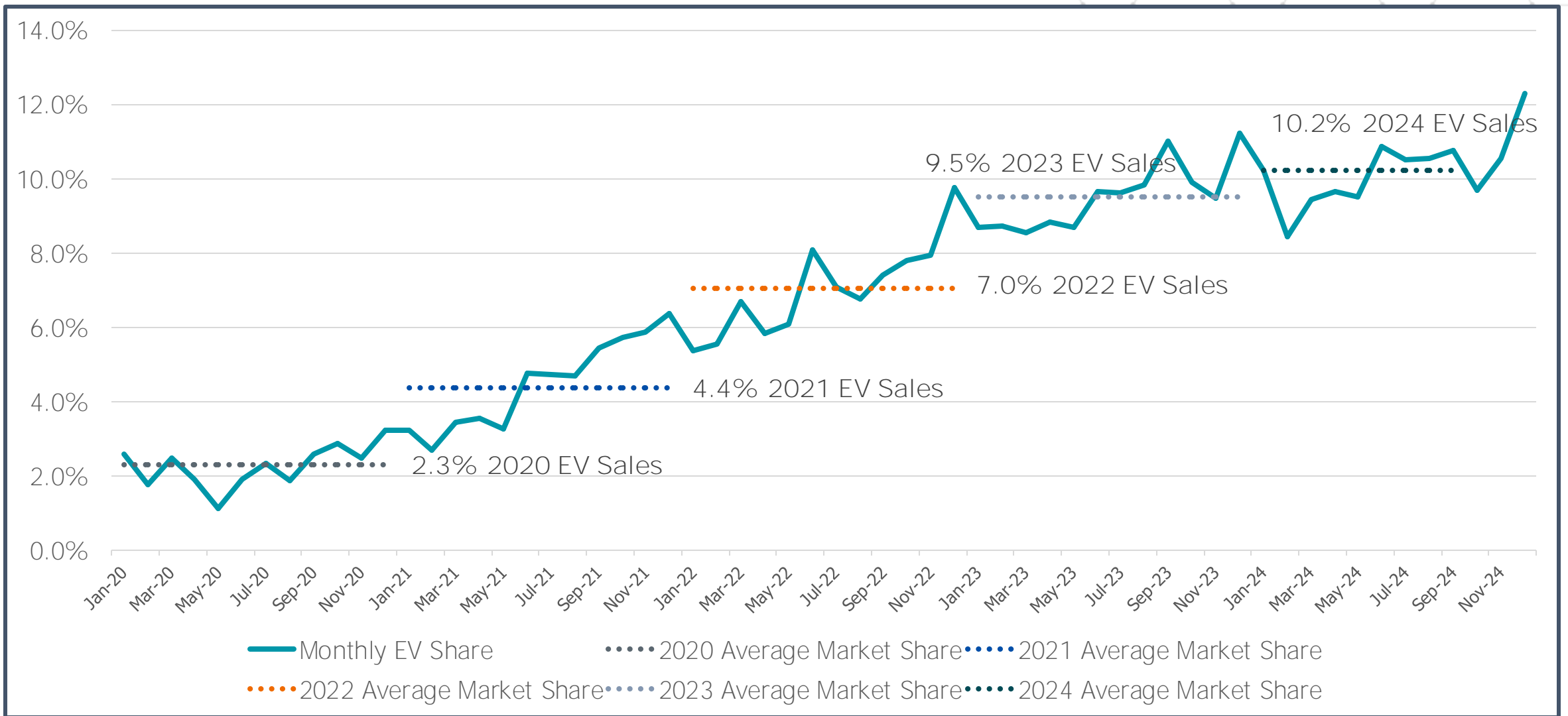
Light trucks (UVs, minivans, and pickups): 81 percent of the EV market

- UVs: 72%

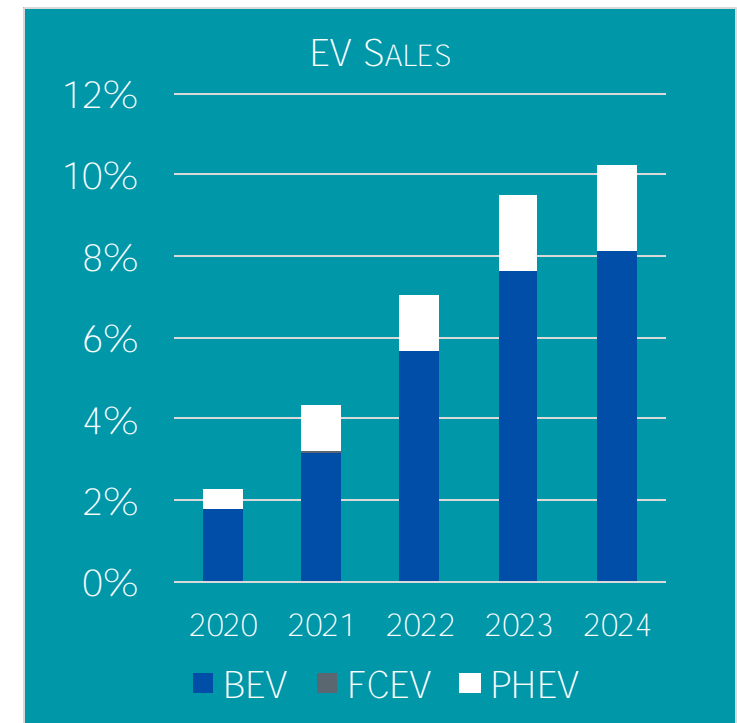
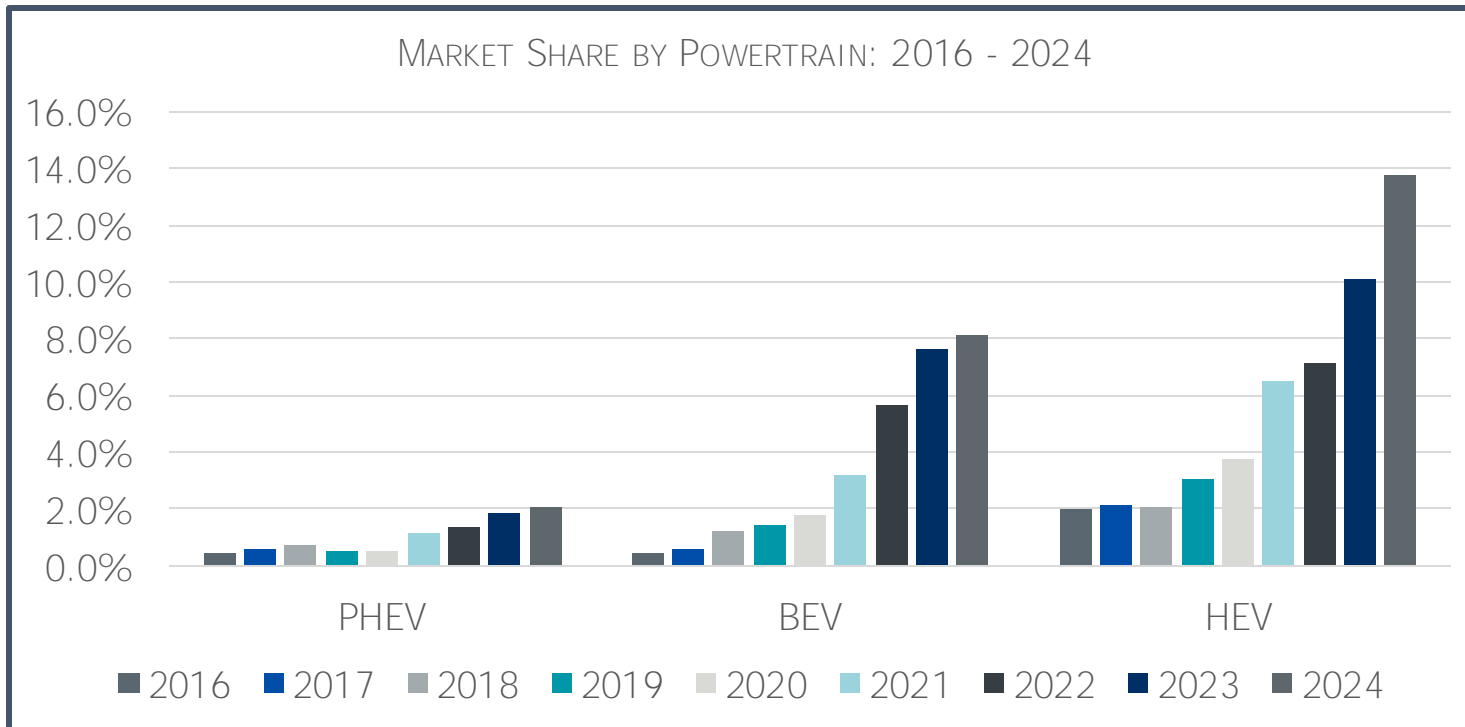
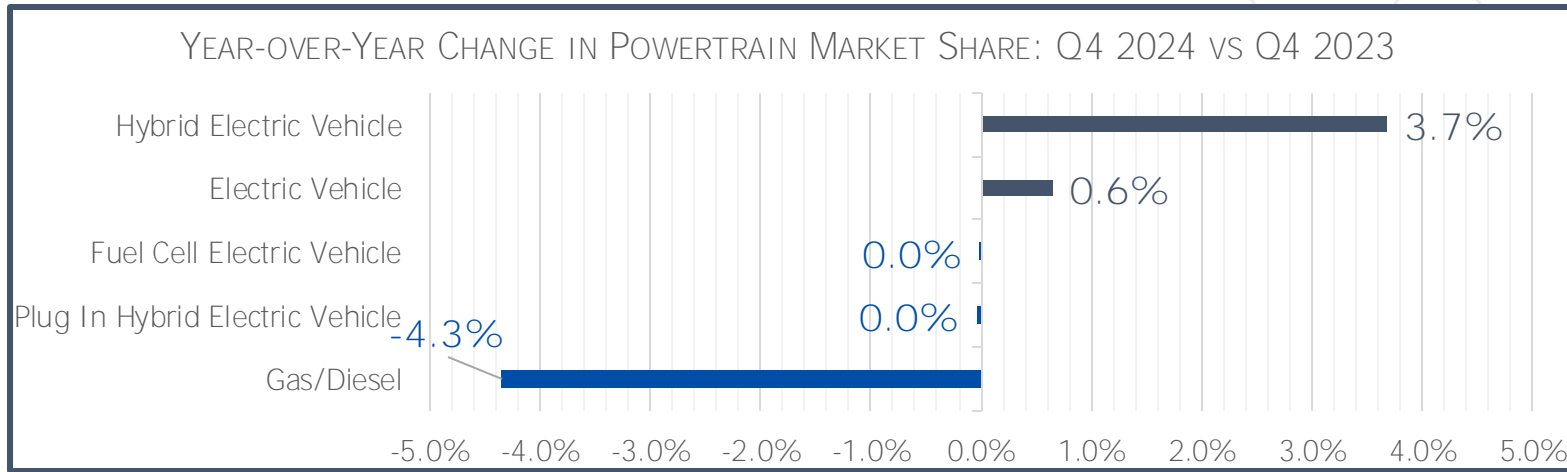
AVERAGE TRANSACTION PRICES



EV MARKET SHARE: JANUARY 2020 - DECEMBER 2024



Market Share by Powertrain



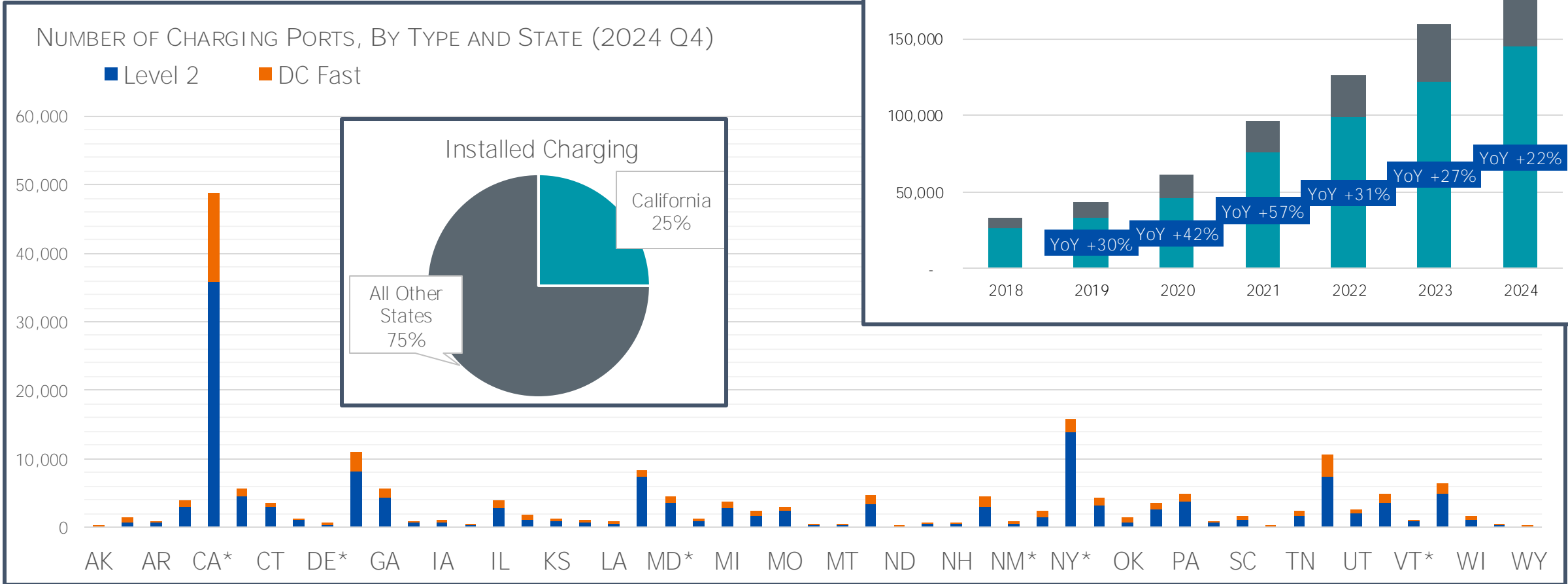
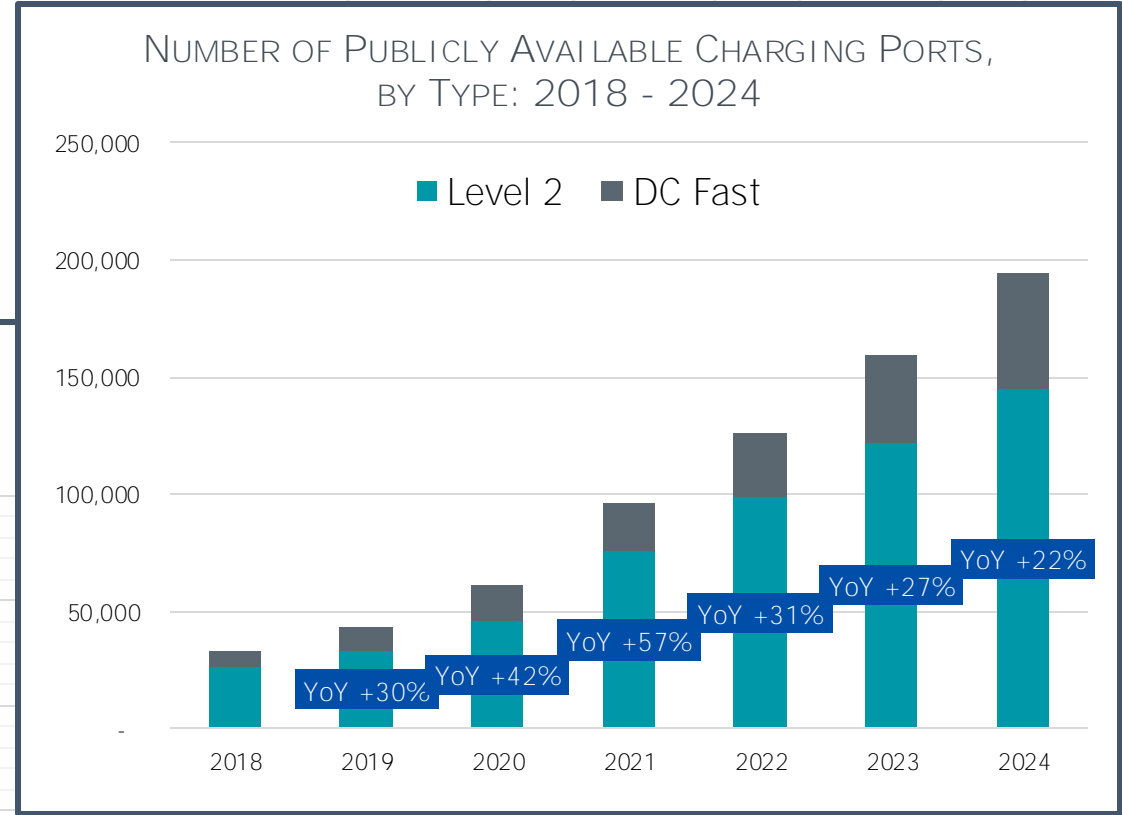


Charging Infrastructure

Charging and Hydrogen Refueling Infrastructure



Level 2: 59,104 Stations, 145,019 EVSE Ports
 DC Fast: 11,747 Stations, 49,748 EVSE Ports
 Hydrogen Refueling: 57 Stations (56 are in California)
U.S. Total: 69,522 Stations, 194,767 EVSE Ports



National Renewable Energy Laboratory analyzed necessary EV charging to support 50 percent EV sales

PRIVATE, L2, AND DC FAST CHARGERS
NEEDED FOR 50% EV SALES BY 2030 / 33
MILLION EVS

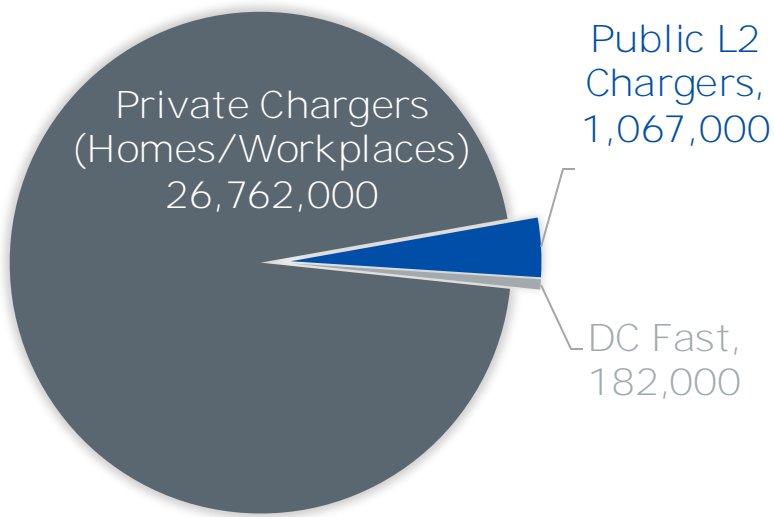


Table 9. State-Level Port Count Summary for the Simulated 2030 Public L2 Network

State	PEVs	Neighborhood	Office	Retail	Other	Total
AK	60,000	500	500	400	1,200	2,600
AL	310,000	2,400	1,700	1,600	3,800	9,500
AR	190,000	1,400	1,300	1,000	2,500	6,200
AZ	780,000	6,900	3,500	4,300	7,600	22,300
CA	7,330,000	74,400	44,000	54,400	89,300	262,100
CO	790,000	7,300	4,100	4,500	9,200	25,100
CT	340,000	3,100	1,500	1,800	3,300	9,700
DC	70,000	800	400	500	800	2,500
DE	100,000	900	400	500	900	2,700

Table 10. State-Level Port Count Summary for the Simulated 2030 Public DC Network

State	PEVs	DC150	DC250	DC350+	Total
AK	60,000	200	200	300	700
AL	310,000	900	900	700	2,500
AR	190,000	800	900	700	2,400
AZ	780,000	1,200	1,100	1,500	3,800
CA	7,330,000	10,700	7,500	10,900	29,100
CO	790,000	1,500	1,200	1,500	4,200
CT	340,000	600	400	500	1,500
DC	70,000	100	100	100	300
DE	100,000	100	100	100	300

Table 9. State-Level Port Count Summary for the Simulated 2030 Public L2 Network

State	PEVs	Neighborhood	Office	Retail	Other	Total
AK	60,000	500	500	400	1,200	2,600
AL	310,000	2,400	1,700	1,600	3,800	9,500
AR	190,000	1,400	1,300	1,000	2,500	6,200
AZ	780,000	6,900	3,500	4,300	7,600	22,300
CA	7,330,000	74,400	44,000	54,400	89,300	262,100
CO	790,000	7,300	4,100	4,500	9,200	25,100
CT	340,000	3,100	1,500	1,800	3,300	9,700
DC	70,000	800	400	500	800	2,500
DE	100,000	900	400	500	900	2,700
FL	1,900,000	19,400	7,100	8,100	16,100	50,700

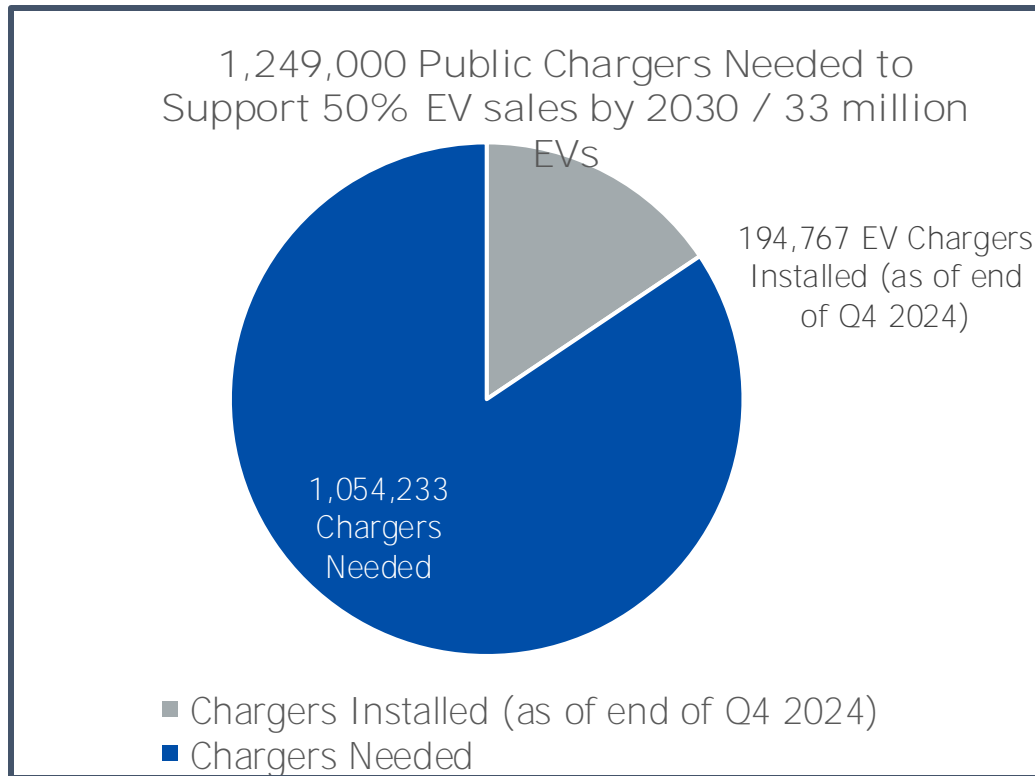
NY	1,420,000	2,500	1,800	2,000	6,300
OH	860,000	1,700	1,700	1,600	5,000
OK	240,000	600	800	800	2,200
OR	720,000	1,200	900	1,500	3,600
PA	1,060,000	1,900	1,600	1,900	5,400
PR	90,000	200	100	200	500
RI	100,000	200	100	100	400
SC	380,000	700	700	600	2,000
SD	70,000	400	300	400	1,100
TN	530,000	1,100	1,200	1,000	3,300
TX	2,230,000	3,900	4,400	5,000	13,300
UT	380,000	700	700	1,200	2,600
VA	950,000	1,800	1,500	1,700	5,000
VT	100,000	300	200	300	800
WA	1,340,000	2,100	1,400	2,100	5,600
WI	530,000	1,300	1,100	1,100	3,500
WV	120,000	400	400	500	1,300
WY	50,000	200	200	400	800

To Meet NREL Recommendations:

1,054,233 More Chargers Needed

- 921,981 L2
- 132,252 DC Fast

Only 194,767 Charging Ports Currently Installed

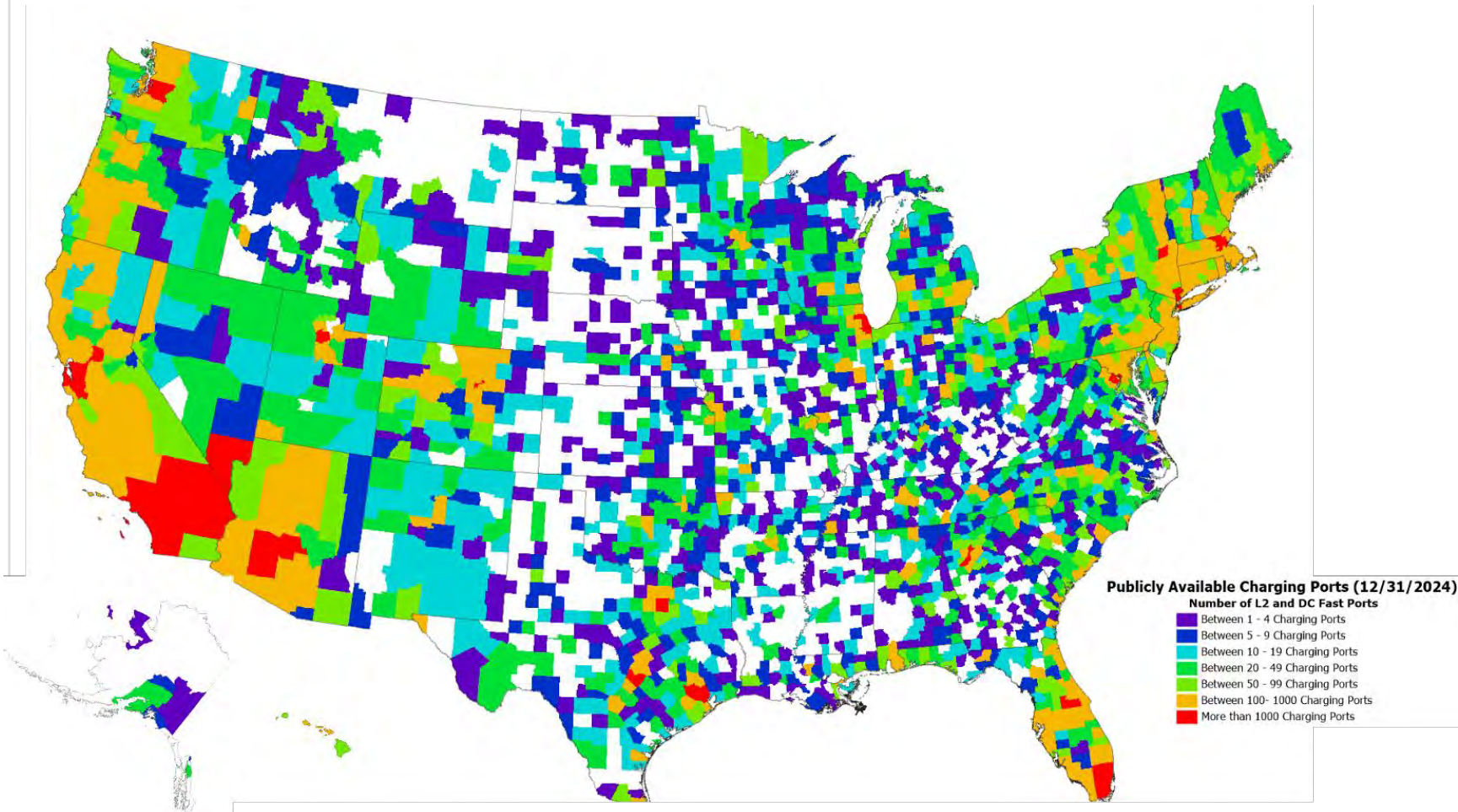


Source: <https://www.nrel.gov/docs/fy23osti/85654.pdf>

Between the end of 2024 and December 31, 2030, 481 chargers need to be installed every day for the next 6 years.

Or 3 chargers every 10 minutes through the end of 2030 (to support 50% EV sales).

Available U.S. Public Charging At The End Of 2024



Counties by the numbers

3144 Counties in U.S.

27% had no access to public charging (854 counties)

41% had 5 or fewer charging ports

1/3 of all charging located in just 25 counties

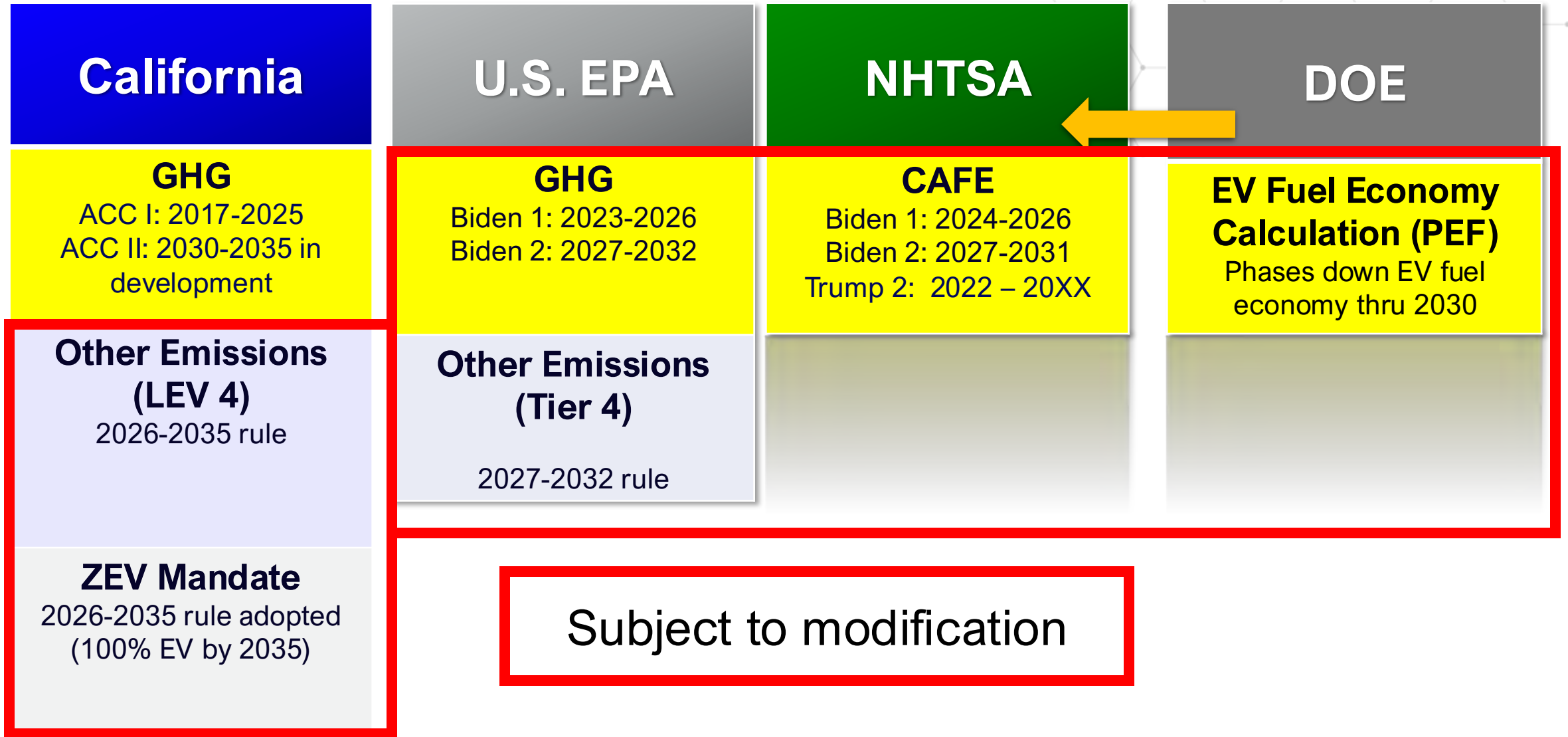
44% had NO DC Fast charging

- 6% had access to 1 DC Fast Charger



Federal policy implications for the auto industry

1 Tailpipe, 4 Agencies, 7 Regulations



Early Trump (47) Actions

Deregulation agenda

- Elimination of “EV mandates”
- Rescinding California waivers

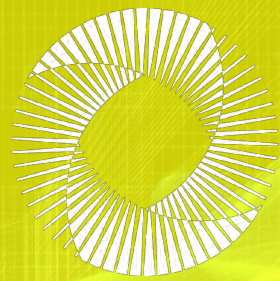
“Leveling the Playing Field”

- Having distribution of unspent and conditional IRA and IIJA funding including NEVI infrastructure funds
- Eliminating EV purchase incentives

Encouraging domestic energy production at all costs – including critical minerals

- Review / revision / rescission of regulations and policies to expedite permitting
- Declaring an “energy emergency” to remove regulatory barriers
- Support for critical mineral projects, contingent on appropriated funds
- Critical minerals as part of the National Defense Stockpile

Trade disputes...



ALLIANCE FOR AUTOMOTIVE INNOVATION

Dan Bowerson
Vice President, Energy & Environment Policy
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Questions for Speakers?

UPCOMING EVENTS



- ▶ Training for States on Integrated Distribution System Planning 2.0
 - April 30-May 1, Denver, Colorado
 - Optional Site Visit to NREL on May 2
 - Technical courses, peer-sharing, and office hours with trainers; all new topics focusing on planning for load growth and local resources; facilitated state action planning throughout
 - <https://www.naruc.org/events/all-events/dsp-training-2-2/>
- ▶ CESA National Energy Summit for States: Navigating Energy Trends and Federal Programs
 - May 28 and 29, Washington, DC
 - More info: <https://www.cesa.org/event/2025-national-energy-summit/>



Next EV SWG Meeting:
April 29, 3:00-4:30 pm
ET via Zoom

WWW.NARUC.ORG/CORE-SECTORS/ENERGY-RESOURCES-AND-THE-ENVIRONMENT/ELECTRIC-VEHICLES/