FEMP
Federal Energy Management Program

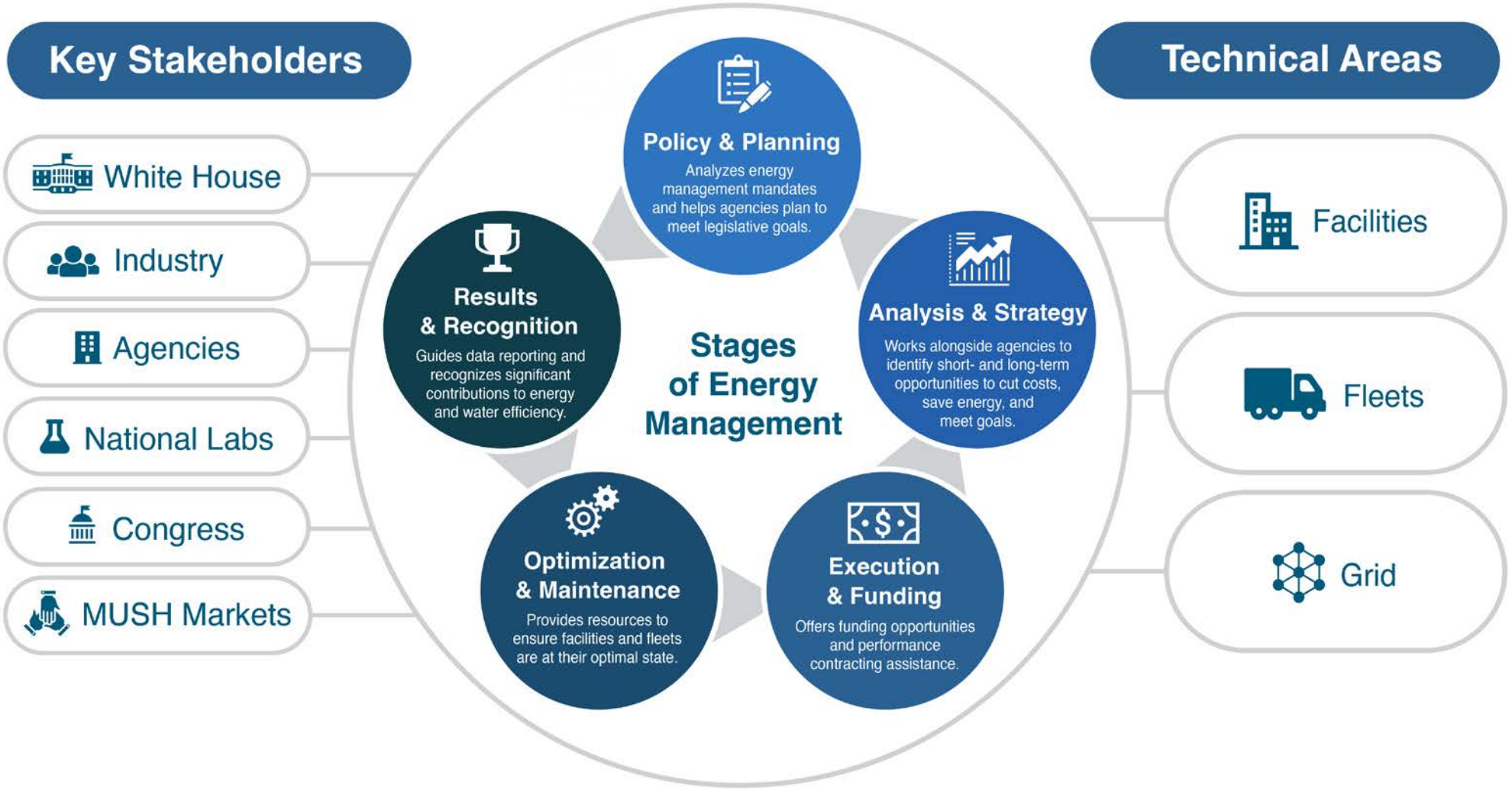
EV Champion Training
Webinar 2: ZEV and EV Charging Planning

Emily Kotz – Federal Fleet Team Lead, NREL
Erin Nobler – Project Manager, NREL
Mark Singer – Senior Transportation Analyst, NREL
Mike Lammert– Senior Commercial Vehicle Technologies Researcher, NREL

Wednesday, Sept. 11, 2–4 p.m. ET

FEMP Focuses on Federal Agency Support

FEMP works with key stakeholders to support all stages of energy management in federal agencies' critical areas



This Training Offers IACET CEUs

How to obtain your CEUs:

1. Visit the Whole Building Design Guide (WBDG) at wbdg.org to log in or create an account
2. Enroll in the training
3. Attend the training in full
4. Return to your WBDG account's Enrolled courses
5. Select the training's "Proceed to Course" button
6. Complete an assessment
7. Submit a training evaluation
8. Download your certificate.

What's an IACET CEU?

An International Association for Continuing Education and Training (IACET) continuing education unit (CEU) is a unit of credit equal to 10 hours of participation in an accredited program designed for professionals with certificates or licenses to practice various professions.

Register Today For Upcoming EV Champion Training

EV Champion Training Series	Date and Time
Training 1: ZEV and EV Charging Fundamentals	Thurs., Aug. 29, 12–2 p.m. ET
Training 2: ZEV and EV Charging Planning	Wed., Sept. 11, 2–4 p.m. ET
Training 3: EV Charging Site Assessments and Budgeting	Wed., Sept. 18, 2–4 p.m. ET
Training 4: EV and EV Charging Design and Implementation	Wed., Oct. 2, 2–4 p.m. ET

Register today for Training 3 and 4!

Agenda

1. Recap from Training 1 & ZEV Ready Framework
2. Identify and Train Team
3. Align HQ Strategy With Site Planning
4. Identify ZEV Opportunities
5. Identify EV Charging Infrastructure Needs
6. Wrap-Up/Q&A

Instructors

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Learning Objectives

- *Recognize FEMP's ZEV Ready Center process*
- *Identify and recognize how to train your ZEV team*
- *Recognize how to demonstrate headquarters and site-level planning strategies*
- *Identify ZEV opportunities and EVSE needs to support your fleet*

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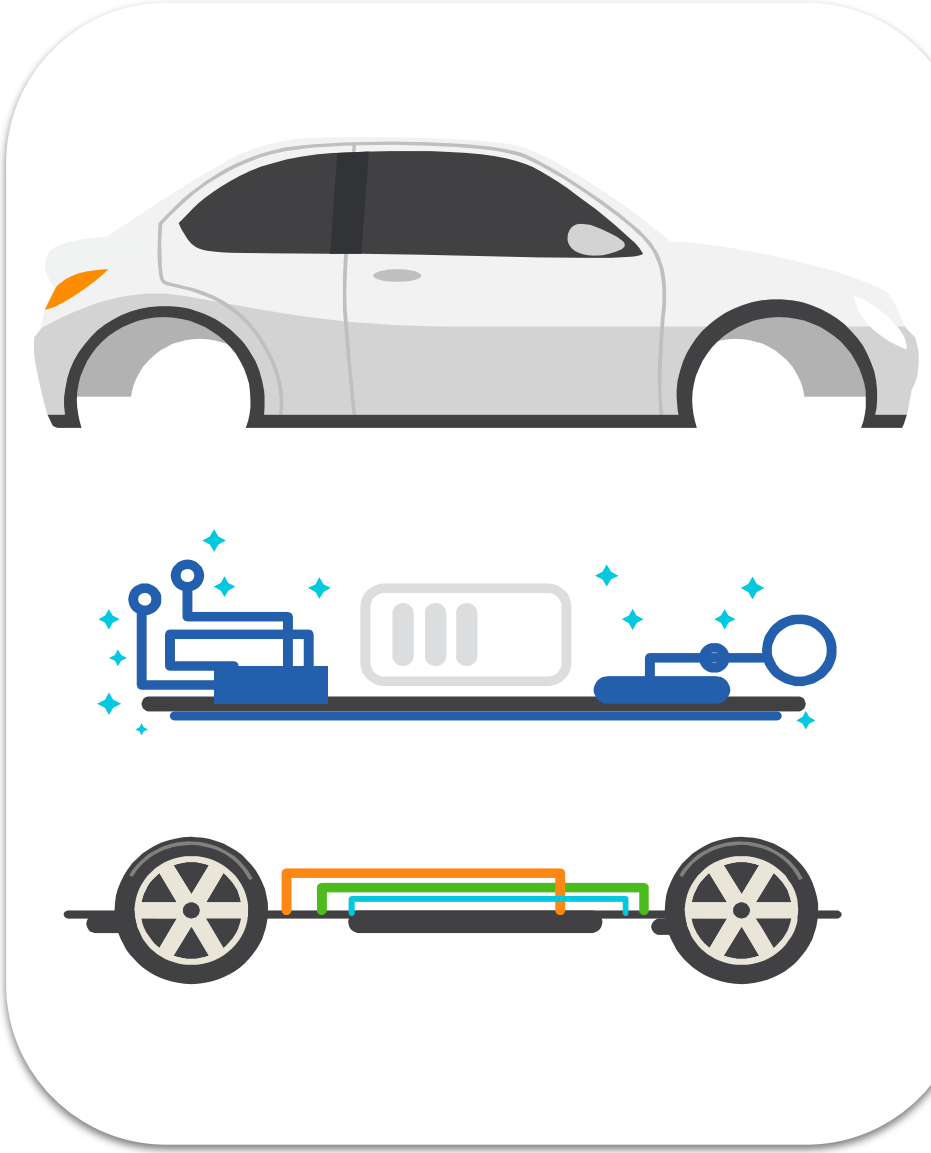
Recap from Training 1

What Is a Zero Emission Vehicle (ZEV)?



ZEVs can produce zero tailpipe exhaust emissions when operating and include:

- Battery-Electric Vehicles (BEV)
- Plug-In Hybrid Electric Vehicles (PHEV)
- Hydrogen Fuel Cell Electric Vehicles (FCEV)

EV Charging Infrastructure

	Input Voltage (V)	Output Power (kW)	Light-Duty Vehicle Charge Rate	Primary Fleet Use
Level 1	120	1.4–1.9	2 to 5 miles of range per hour of charging	PHEVs and low mileage BEVs
Level 2	208 or 240	2.9–19.2	10 to 40 miles of range per hour of charging	BEVs that don't require a quick recharge
DC Fast	Typically 480	25–350	100 to 200+ miles of range in 30 minutes of charging	BEVs that need a quick recharge

Administration Priority: *Transitioning to a ZEV fleet*

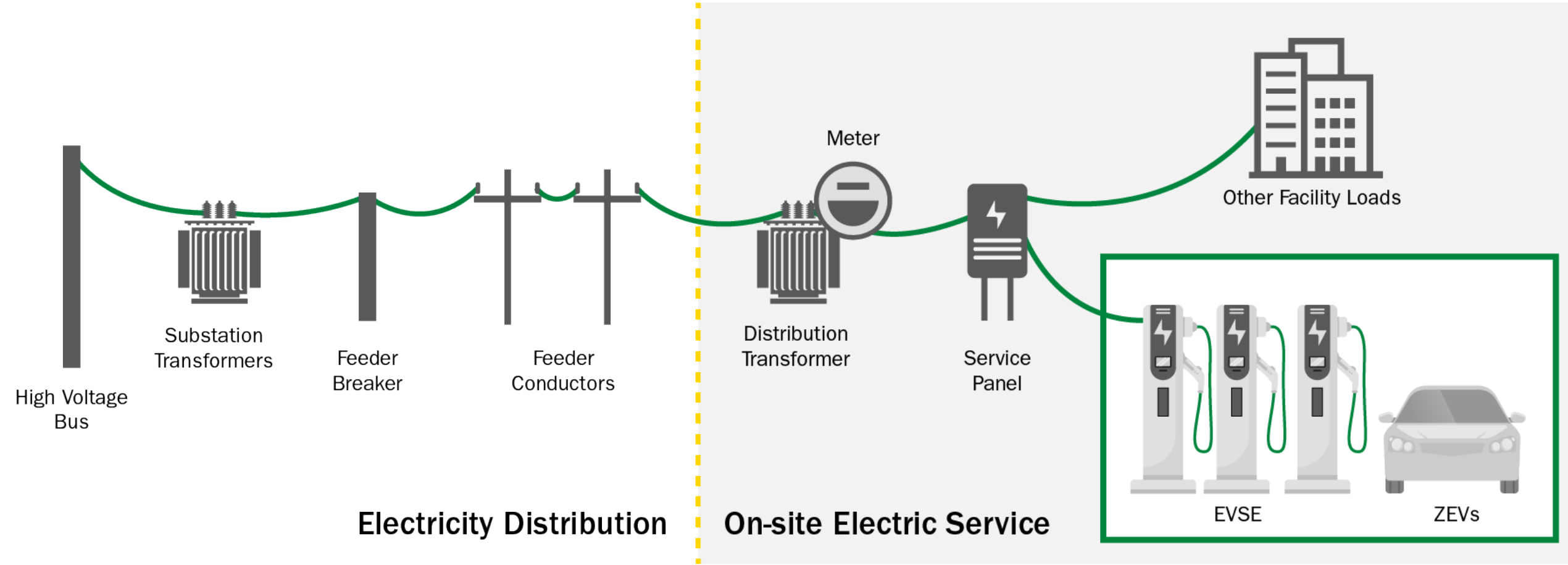
Executive Order 14057

- 100% light-duty ZEV acquisitions by FY27
- 100% overall ZEV acquisitions by FY35
- Update annual ZEV strategic plans

Federal Fleet
ZEV Ready Center

Why ZEV Ready?

Site-level fleet electrification doesn't just happen



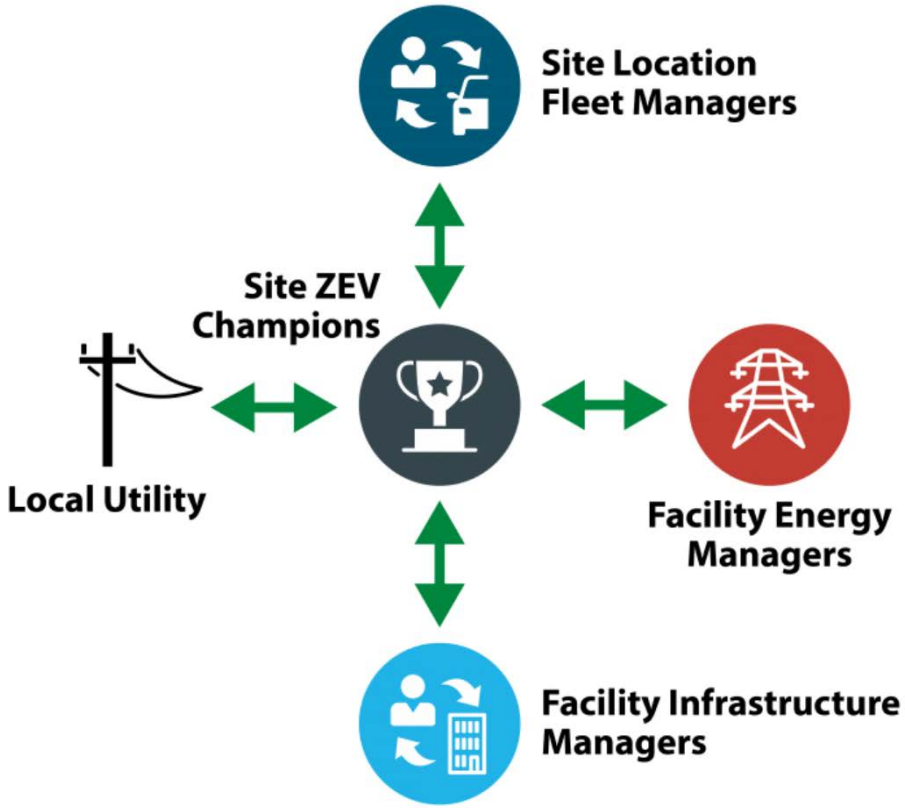
The Federal Fleet ZEV Ready Center can help!

Teamwork and Coordination

The ZEV Ready Solution

Helps sites **engage and form a team** of key electrification partners

Supports **coordination and collaboration**



Federal Fleet ZEV Ready Center

Planning → **Design** → **ZEV Active**

https://www.energy.gov/femp/overview-zev-ready-federal-fleet-electrification-process

ZEV Ready Planning Phase

Step 1

Identify and train team

Team Ready

Step 2

Align HQ strategy with site planning

Commitment Ready

Step 3

Identify ZEV Opportunities

Vehicle Ready

Step 4

Identify EVSE Needs

Charging Ready

Step 5

Initial utility coordination

Charging Ready

Step 6

Quick site assessment

Charging Ready

Step 7

Coordinate site financial planning with headquarters

Commitment Ready

ZEV Ready Design and Active Phase

Step 8

Engage with key electrification stakeholders at site

Team Ready

Step 9

Coordinate with local utility service

Charging Ready

Step 10

Complete site assessment and design EVSE

Charging Ready

Step 11

Identify EVSE at non-agency locations

Charging Ready

Step 12

Work with leadership to secure EVSE funding

Commitment Ready

Step 13

Acquire ZEVs and EVSE

ZEV Ready

Step 14

Install and activate EVSE

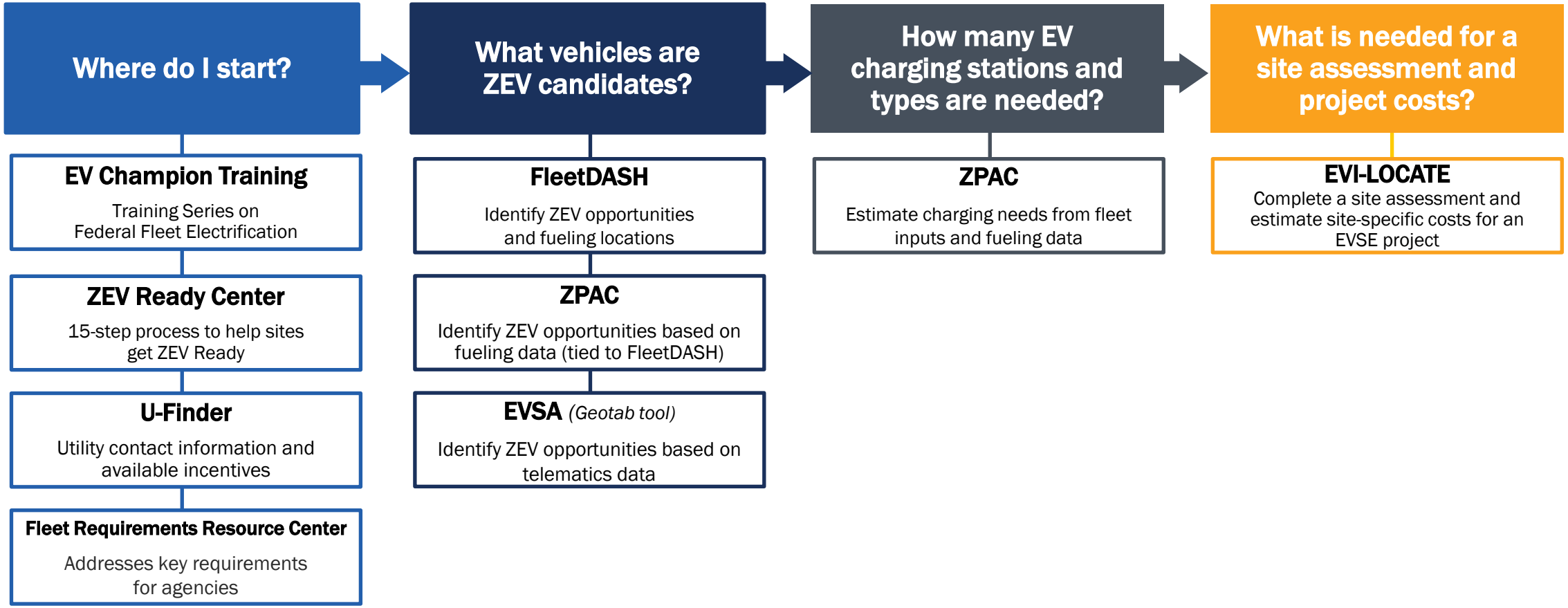
ZEV Ready

Step 15

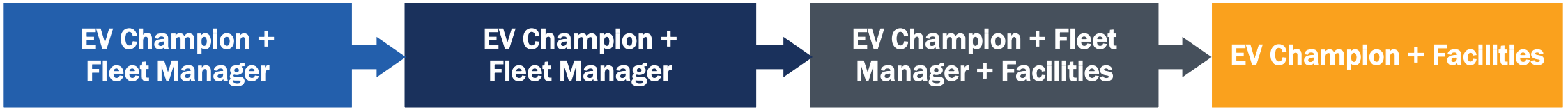
Support drivers in using ZEVs and EVSE

ZEV Ready

Federal Fleet Tools



Who should take the lead on using the tool?



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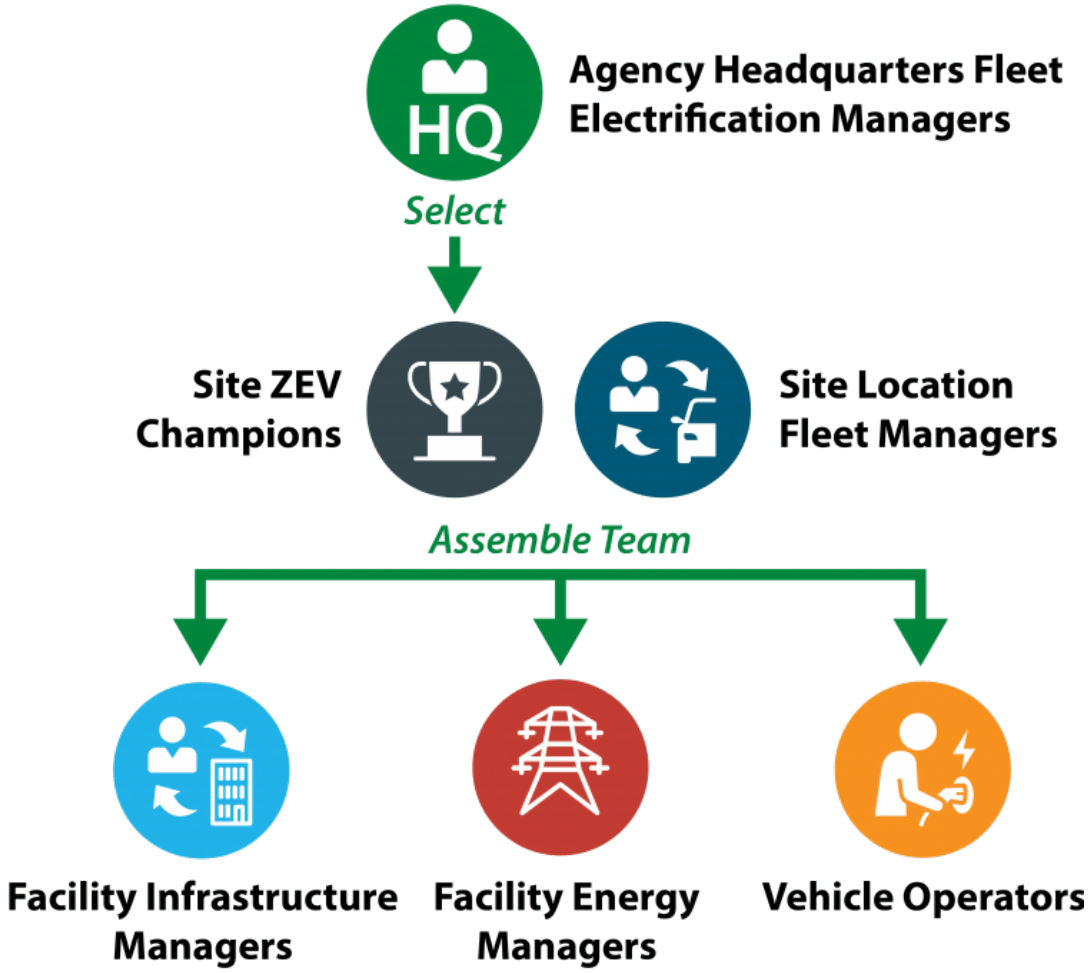
1. Identify and Train Team

It’s a Team Effort

- Identify and assemble the team
- Process requires strong and frequent collaboration
- Led by Site ZEV Champion



Team Members and Roles

Agency Headquarters Fleet Electrification Manager	Responsible for overall electrification of each federal fleet
Site ZEV Champion	Responsible for executing the ZEV Ready planning framework at the site location
Site Location Fleet Manager	Responsible for informing on how many ZEVs should be acquired, in which locations, and coordinating with facility infrastructure manager
Facility Infrastructure Manager	Responsible for planning the installation of EVSE and upgrades to the supporting electrical infrastructure and their ongoing maintenance
Facility Energy Manager	Responsible for integrating EVSE into overall facility energy plans
Vehicle Operators	Responsible for charging vehicles at fleet facilities and/or while in transit

Who Else May Need to Be Involved?

- Contracting and Procurement
- Sustainability Leadership
- HQ Property Management
- GSA Fleet Service Representatives
- Local Utilities
- Cybersecurity
- Site Engineers and Planners
- Fire Marshal

Fleet Electrification Training

Online training videos and materials organized by stakeholder

Short trainings available for each step of the ZEV Ready Center process.

https://www.energy.gov/femp/federal-fleet-zev-ready-center

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2. Align HQ Strategy With Site Planning

Step Overview

This step describes how agency headquarters and sites should coordinate in developing fleet electrification strategies and plans.

- Understand federal fleet sustainability requirements
- Develop and refine long-term plans for electrification
- Translate strategic plans into execution at each site

Incorporating Electrification into the Zero-Emission Fleet Strategic Plan and Sustainability Plan

1. Establish an overall fleet management strategy
2. Align strategy with fleet regulatory requirements
3. Determine ZEV acquisition rates, EVSE deployment needs, and petroleum reduction strategies for each fleet location
4. Create multi-year strategic plans for fleet electrification and petroleum reduction

Using Fleet Data to Inform Electrification Strategies

1. **Identify potential candidate vehicles** for replacement with ZEVs.

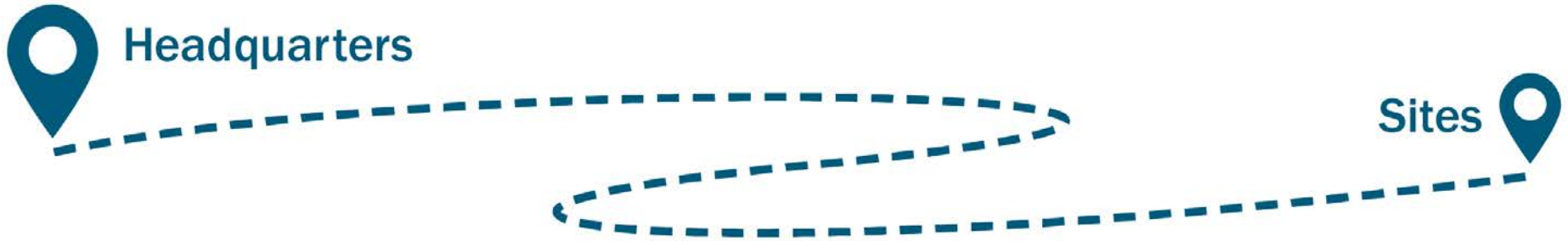
2. **Inform the selection, siting, and installation of EVSE** at federal facilities.

3. **Assess current progress** in fleet electrification both overall and at each fleet location.

4. **Evaluate the historical effectiveness** of electrification strategies at each fleet location.

Aligning Fleet Electrification Strategy and Planning

Alignment and coordination between headquarters and sites on fleet electrification is crucial to effective EVSE deployment.



Support fleet electrification efforts through strategic planning

- Establish agency goals and standards
- Select candidate locations
- Allocate funding
- Identify and overcome barriers

Implement the headquarters strategic plans

Deploy ZEVs and EVSE using available resources, guidance, and standards provided by agency headquarters

Best Practices

- Ensure agency plans support the acquisition and deployment of ZEVs and charging infrastructure to meet sustainability and EO goals.
- Accurate fleet data is essential for making good decisions on fleet electrification.
- Fleet electrification project management officers (PMOs) can set policies, develop strategies, and help coordinate site-level execution.
- Coordination between headquarters and sites is key for successful EVSE deployment.
- It's challenging to execute plans at each site; headquarters should balance oversight with allowing sites to adapt to their needs.

Reporting Requirements for EV and EVSE

FEMP Best Practices on ZEV Charging

EVSE Electricity Use at Federal Buildings:

Best Practices for Federal Facility Measurement and Reporting Electricity Use from Electric Vehicle Supply Equipment

Fleet Vehicle Charging Electricity Use:

Best Practices for Federal Fleet Measurement and Reporting Electricity Use in Electric Vehicles

Why Track EVSE Electricity Use at Buildings?

EVSE Electricity Use at Federal Buildings

- **Compliance with EO 14057:** The Implementing Instructions state “Agencies must separately track energy used for vehicle charging and overall facility energy consumption.”
- **Benchmarking:** Facilities are required to benchmark building energy performance. Installation of EVSE units can affect a building's electricity use, making separate tracking essential to avoid impacting energy performance ratings.
- **Reporting Requirements:** Agencies are required to report EVSE electricity usage in their Annual Energy Management Data Report and the FAST Fueling Center and EVSE Inventory submission.

Options for Tracking EVSE Electricity Use

Metering at the Panel	Submetering at the Panel	Networked EVSE	Telematics	Estimate
Consider for larger EVSE installations that have a dedicated panel	Consider for smaller installations where the panel is used for more than just EVSE units	Networked EVSEs have a higher purchase cost and networking fees	Only collects data on vehicles with telematics installed (fleet only charging stations)	Use EPA ENERGY STAR published adjustments to estimate EVSE electricity use (least accurate option)

EPA ENERGY STAR EVSE Adjustments: https://www.energystar.gov/buildings/benchmark/understand-metrics/score-details/ev-charging

Reporting on ZEV Charging Electricity Use

Fleet Vehicle Charging Electricity Use

Federal Fleet Data Call: Federal Automotive Statistical Tool (FAST) Vehicle-Level Data, Fueling Data

Fueling data reported for all fleet vehicles, including kilowatt-hours (kWh) added to the zero-emission vehicle ZEV during charging for the previous fiscal year. The following vehicle-level data is required:

- Vehicle identification
- Date of charging session
- Location of charging session
- Type and volume of fuel added to the vehicle (i.e., kWh)
- Fuel cost (if any)

Use This Method to Track Charging Electricity Use if the ZEV:

Telematics
BEST PRACTICE

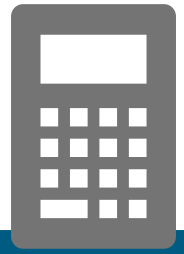
Has a telematic device installed, and the fleet has a method to track public charging session costs

Networked EVSE

Charges on-site at a networked EVSE, and the fleet has a method to log other charging sessions, including costs

Charging Session Logs

Does not have telematics, doesn't charge at a networked EVSE, and the fleet has a method to log and collect charging sessions



Estimate

Does not have telematics, doesn't charge at a networked EVSE, and driver logs are not feasible

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3. Identify ZEV Opportunities

GSA Vehicle Offerings

Download the **ZEV Fact Sheet** at gsa.gov/afv to find current ZEV offerings

- Sedans
- SUVs
- Pickups
- Vans
- Stake trucks
- Tractors
- Shuttle Buses
- Transit Buses
- School Buses
- Work Buses
- Ambulances

Hyundai Ioniq 5, VW ID4, Chevy Blazer, Equinox, Mustang Mach-E, Model Y, Outlander, Kia Sorento, Ford Escape, Jeep Grand Cherokee & Rubicon

Chrysler Pacifica, Ram Promaster, Ford E-Transit Cargo and passenger

Tesla Model 3 & Hyundai Ioniq 6

F150 Lightning & Chevy Silverado

PHEV

BEV

Source: GSA

ZEV Suitability Tools
EVSA, ZPAC, and FleetDASH

ZEV Site Considerations

Step 1 Evaluate the mission and operating characteristics of existing vehicles at the fleet location

Step 2 Assess ZEV suitability to determine which vehicles are possible candidates for electrification

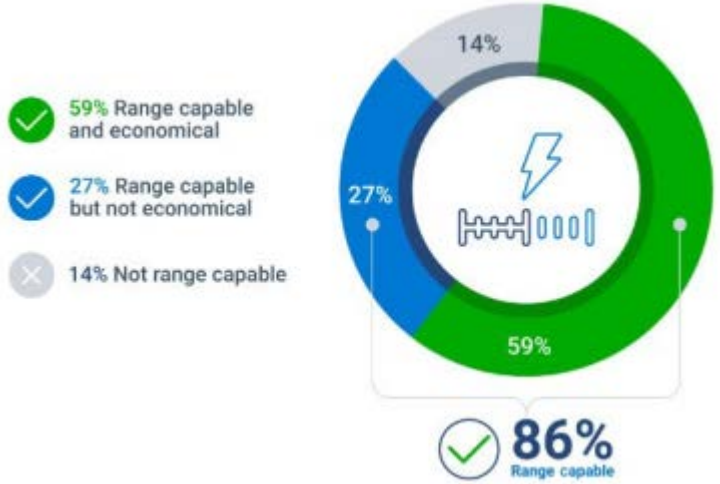
Step 3 Determine the feasibility of installing EVSE at fleet locations to support those vehicles

GSA & Geotab: EV Suitability Assessment (EVSA)

An automated telematics-based EV procurement recommendation tool powered by data intelligence for optimizing EV acquisition and deployment strategies.

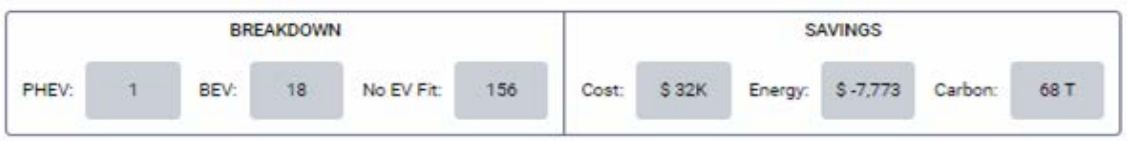
A Data-Driven Approach to EO 14057 Compliance

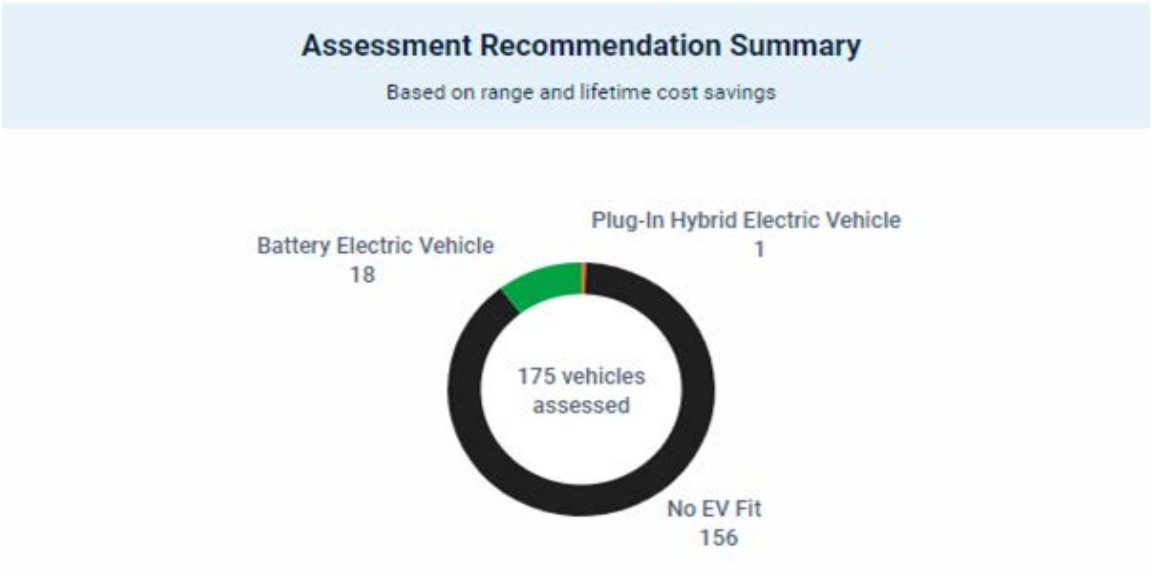
Going EV? Use Geotab telematics + EVSA to do it effectively.
Can't go EV? Use Geotab telematics + EVSA to explain why not.

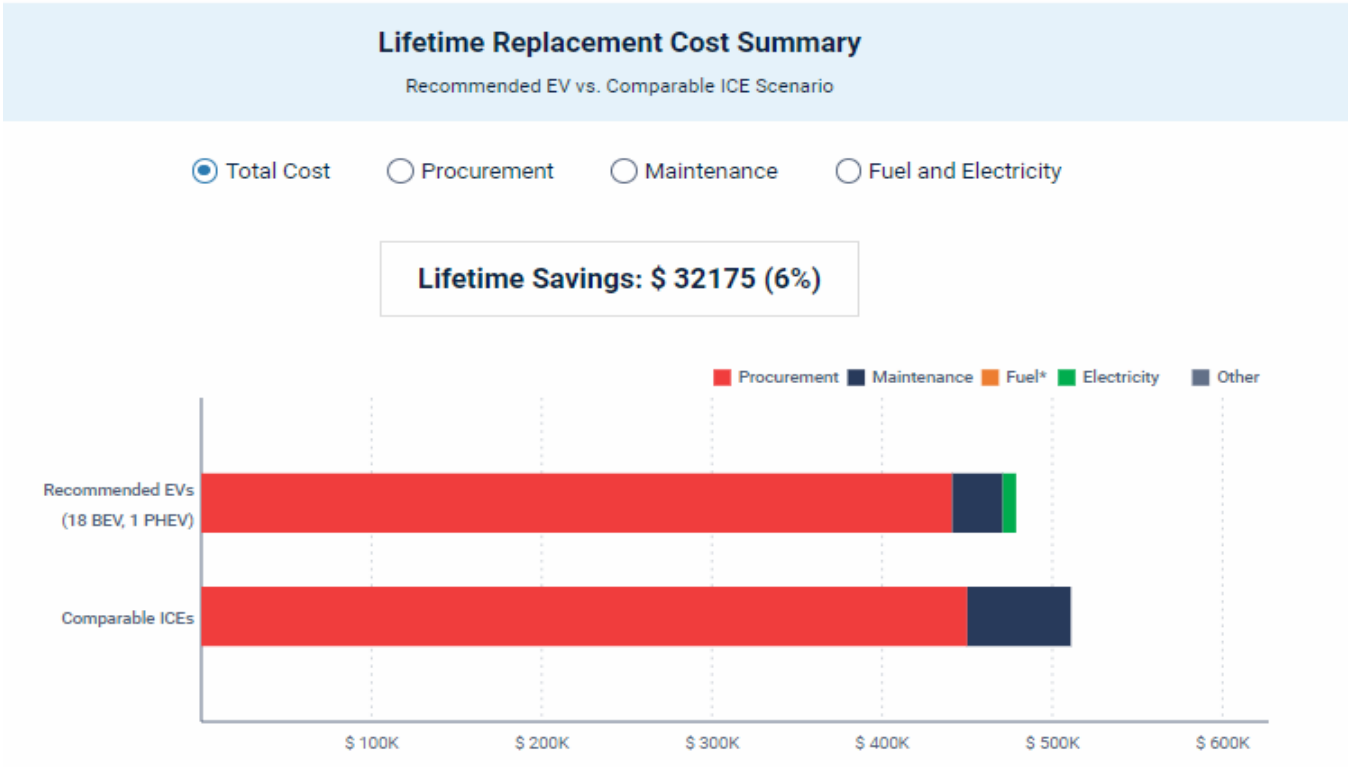


Source:
https://www.gsa.gov/system/files/DTW%20Telematics%20Program%20Update%203_7_2024.pdf

GSA & Geotab: EV Suitability Assessment (EVSA)







Conservative analysis identifies 18 vehicles that are suitable for EV (namely, the Chevrolet Bolt EUV) that are (i) range capable and (ii) have a lower total cost of ownership inclusive of incremental costs *without* requiring daytime charging (e.g., ground fruit).

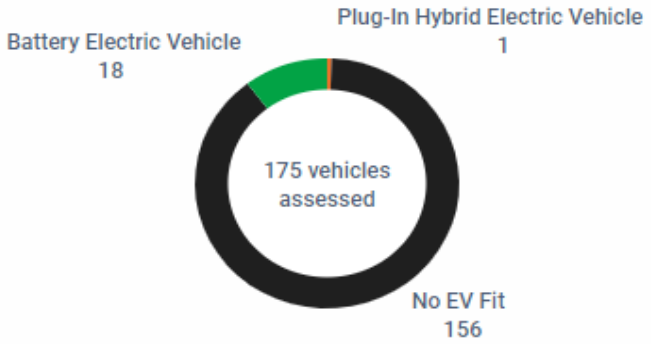
Source:
https://www.gsa.gov/system/files/DTW%20Telematics%20Program%20Update%203_7_2024.pdf

GSA & Geotab: EV Suitability Assessment (EVSA)

BREAKDOWN						SAVINGS					
PHEV:	1	BEV:	18	No EV Fit:	156	Cost:	$ 32K	Energy:	$ -7,773	Carbon:	68 T

Assessment Recommendation Summary

Based on range and lifetime cost savings

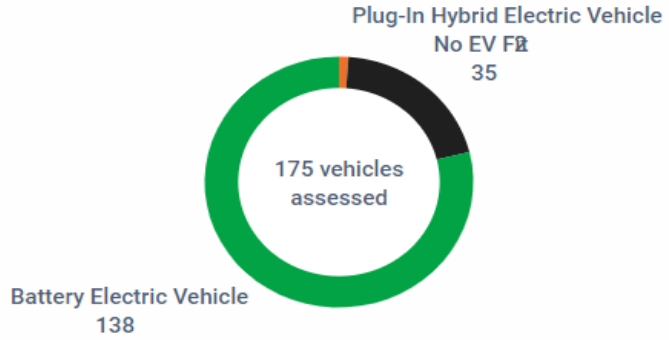


Before

BREAKDOWN						SAVINGS					
PHEV:	2	BEV:	138	No EV Fit:	35	Cost:	$ 109K	Energy:	$ -169K	Carbon:	1,143 T

Assessment Recommendation Summary

Based on range and lifetime cost savings



After:

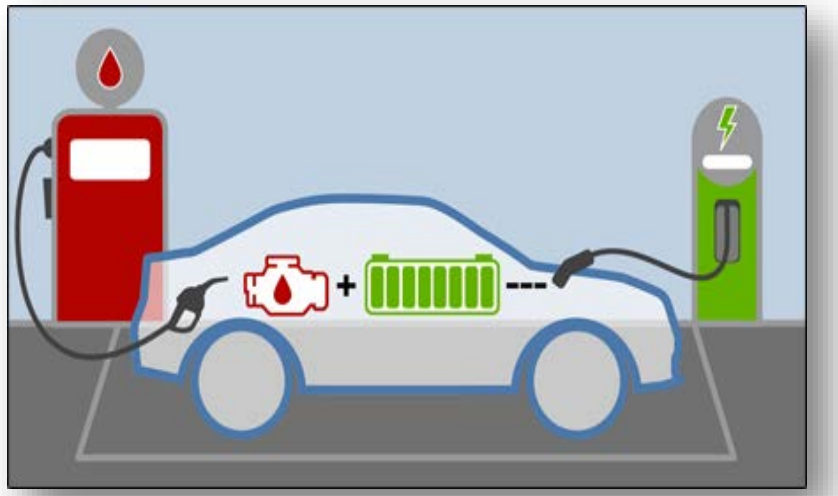
Consider acceptable daytime charging and available funds for EV incremental costs

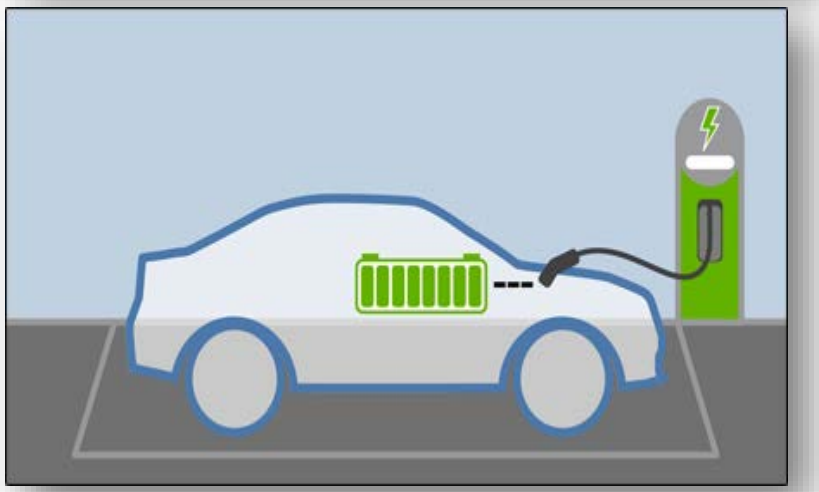
Source:
https://www.gsa.gov/system/files/DTW%20Telematics%20Program%20Update%203_7_2024.pdf

GSA & Geotab EVSA: How to Get Started

If you would like to reserve a spot for a full-service EVSA analysis on your eligible fleet, including a presentation of results and recommendations, email **fleetsolutions@gsa.gov** using the title “EVSA Expression of Interest" and include the following:

- Agency
- Bureau
- MyGeotab Database Owner (Fleet Manager) name and email
- MyGeotab Database name: govXXXXX
- MyGeotab Database Group Name (if applicable)

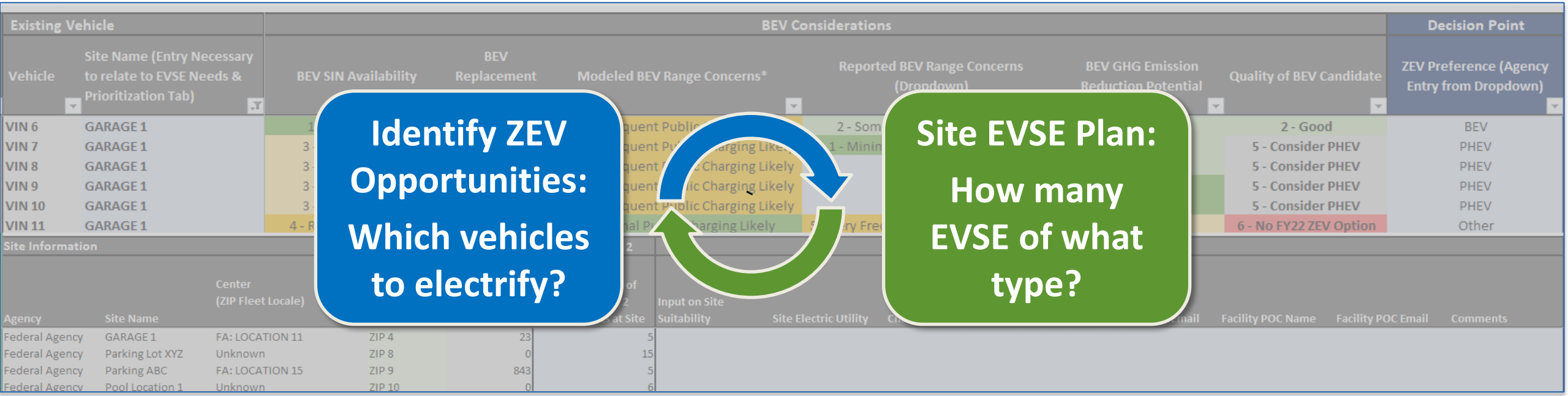




Source:
https://www.gsa.gov/system/files/DTW%20Telematics%20Program%20Update%203_7_2024.pdf

ZPAC Overview

Zero Emission Vehicle (ZEV) Planning and Charging (ZPAC) Tool



Existing Vehicle		BEV Considerations						Decision Point
Vehicle	Site Name (Entry Necessary to relate to EVSE Needs & Prioritization Tab)	BEV SIN Availability	BEV Replacement	Modeled BEV Range Concerns*	Reported BEV Range Concerns (Dropdown)	BEV GHG Emission Reduction Potential	Quality of BEV Candidate	ZEV Preference (Agency Entry from Dropdown)
VIN 6	GARAGE 1	1		quent Public	2 - Som		2 - Good	BEV
VIN 7	GARAGE 1	3		quent Pu arging Like	1 - Minin		5 - Consider PHEV	PHEV
VIN 8	GARAGE 1	3		quent C Charging Likely			5 - Consider PHEV	PHEV
VIN 9	GARAGE 1	3		quent ic Charging Likely			5 - Consider PHEV	PHEV
VIN 10	GARAGE 1	3		quent Public Charging Likely			5 - Consider PHEV	PHEV
VIN 11	GARAGE 1	4 - R		al P arging Likely	ry Fre		6 - No FY22 ZEV Option	Other

Site Information												
Agency	Site Name	Center (ZIP Fleet Locale)		of 2 at Site	Input on Site Suitability	Site Electric Utility			Facility POC Name	Facility POC Email	Comments	
Federal Agency	GARAGE 1	FA: LOCATION 11	ZIP 4	23	5							
Federal Agency	Parking Lot XYZ	Unknown	ZIP 8	0	15							
Federal Agency	Parking ABC	FA: LOCATION 15	ZIP 9	843	5							
Federal Agency	Pool Location 1	Unknown	ZIP 10	0	6							

Identify ZEV Opportunities:

Which vehicles to electrify?

Site EVSE Plan:

How many EVSE of what type?

ZPAC is an Excel-based fleet electrification planning tool.

Email mark.singer@nrel.gov for your fleet-specific tool.

ZPAC Inputs and Overview

Provides a holistic **ZEV and EVSE planning framework.**

Annual FAST submission provides your agency's **complete inventory.**

FleetDASH provides additional attributes, **analysis**, and **mapping capability.**

GSA AFV guide provides **ZEV vehicle type availability.**

User-provided vehicle locations are based on FAST fleet hierarchy fields.

Supports **ZEV Strategic Plans** and **Quarterly EVSE Deployment** reporting.

ZPAC Process

Step 1: Define Fleet Locations

Step 2: Evaluate Vehicles and Plan ZEV Acquisitions

Step 3: Evaluate EVSE Needs for ZEV Acquisitions

Step 4: Evaluate High Level Plan

https://www.energy.gov/femp/using-zero-emission-vehicle-planning-and-charging-tool

ZPAC Step 1: Define Fleet Locations

Fleets begin by identifying specific parking locations where ZEVs will be parked and require charging infrastructure.

Step 1. Identify Site Locations for ZEV Evaluation and EVSE Installation

Site Number	INPUT 1. REQUIRED Define Site Names	Address	City	State	Zip	Parking Lot Real Property ID	Comments
1	SITE 1 Building A				ZIP1		
2	SITE 1 Building D				ZIP2		
3	SITE 1 Building X				ZIP3		
4	SITE 1 Building Z				ZIP4		
5	SITE 2 Parking Lot 1				ZIP5		
6	SITE 2 Parking Lot 3				ZIP6		
7	SITE 2 Parking Lot 7				ZIP7		
8	SITE 2 Parking Lot Z				ZIP8		
9	SITE 2 Parking Lot YY				ZIP9		

Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 2: Evaluate Vehicles and Plan ZEV Acquisitions

Each vehicle is assigned a site name from the sites defined in Step 1.

Step 2. Assign Vehicles to Specific Sites and Plan ZEV Acquisitions

Fleet Information				Key Input	Existing Vehicle Information									
				INPUT 1. REQUIRED										
FAST Fleet Abbreviation	FAST Fleet Name	BOAC (FleetDASH if available)	FAST ZIP	Site Name (Entry Necessary to relate to EVSE Needs & Prioritization Tab)	VIN	License Plate (FleetDASH if available)	Vehicle Ownership (FAST)	Model Year (FAST)	Fuel Type (FAST: VIN Decoded)	Esimated Vehicle Age (in 2024)	Existing Vehicle Weight Class (FAST: VIN Decoded)	Existing Vehicle Type (FAST: VIN Decoded)	Existing ZEV? (FAST: VIN Decoded)	Existing SIN (FleetDASH if available)
B2	Bureau 2	BOAC3	ZIP8	SITE 2 Parking Lot YY	VIN933	TAG932	GL-W	2021	DSL DE	3	MD/HD	HD	Non-ZEV	625
B2	Bureau 2	BOAC7	ZIP8	SITE 2 Parking Lot YY	VIN934	TAG933	GL-W	2022	GAS DE	2	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC2	ZIP8	SITE 2 Parking Lot YY	VIN935	TAG934	GL-W	2022	GAS DE	2	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC26	ZIP8	SITE 2 Parking Lot YY	VIN936	TAG935	GL-W	2021	GAS DE	3	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC17	ZIP8	SITE 2 Parking Lot YY	VIN937	TAG936	GL-W	2022	GAS DE	2	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC20	ZIP8	SITE 2 Parking Lot YY	VIN949	TAG948	GL-W	2021	GAS DE	3	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC26	ZIP8	SITE 2 Parking Lot YY	VIN950	TAG949	GL-W	2021	GAS DE	3	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC3	ZIP8	SITE 2 Parking Lot YY	VIN951	TAG950	GL-W	2021	GAS DE	3	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC23	ZIP8	SITE 2 Parking Lot YY	VIN952	TAG951	GL-W	2022	GAS DE	2	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC12	ZIP8	SITE 2 Parking Lot YY	VIN953	TAG952	GL-W	2021	GAS DE	3	LD	Sedan/St Wgn Compact	Non-ZEV	9
B2	Bureau 2	BOAC2	ZIP8	SITE 2 Parking Lot YY	VIN954	TAG953	GL-W	2022	GAS DE	2	LD	Sedan/St Wgn Compact	Non-ZEV	9

Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 2: Evaluate Vehicles and Plan ZEV Acquisitions

Each vehicle ZEV suitability is evaluated.

- Vehicles included in FleetDASH have an estimate for public charging needs due to long distance travel.

Step 2. Assign Vehicles to Specific Sites and Plan ZEV Acquisitions

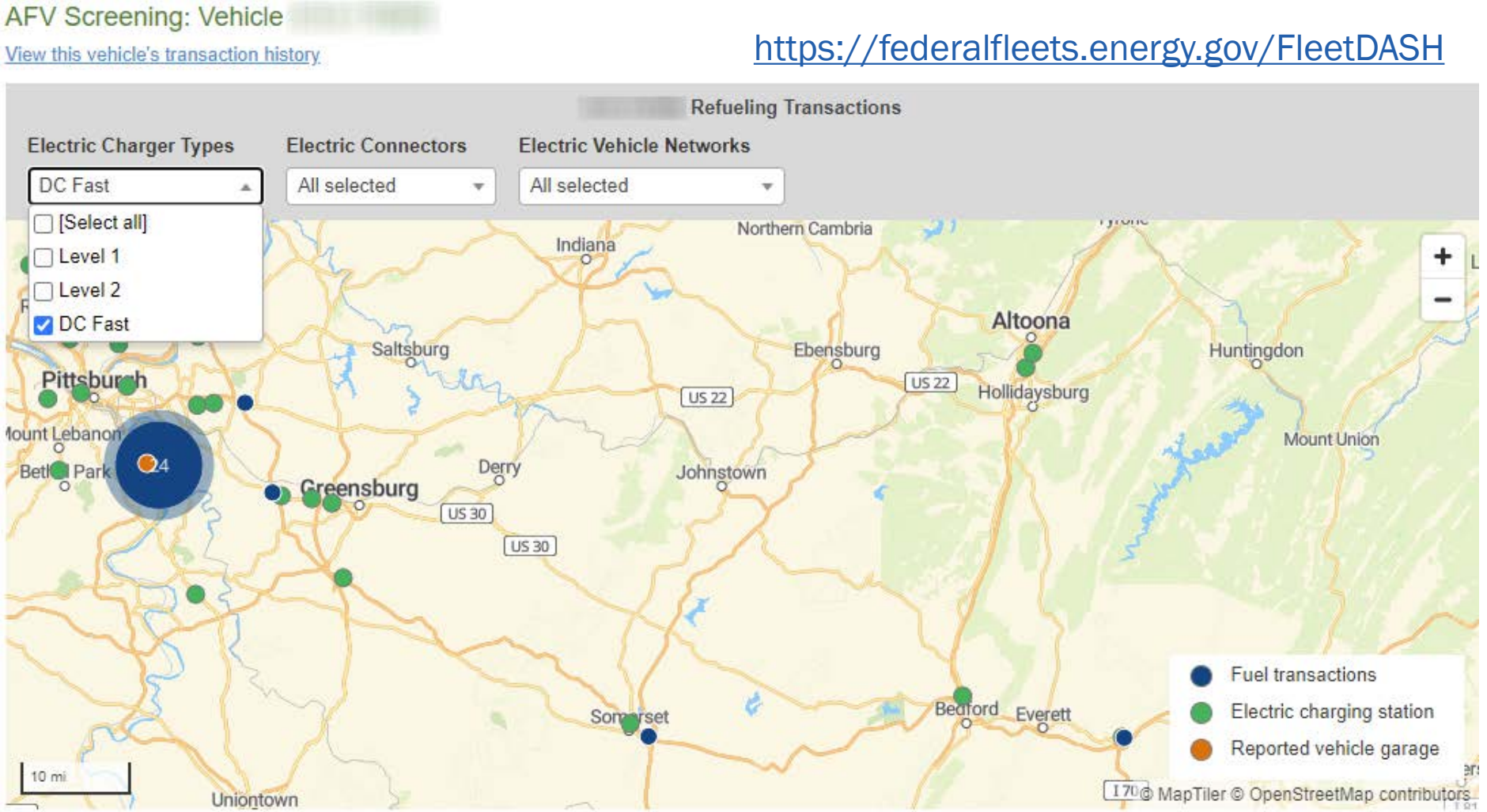
BEV Considerations					PHEV Considerations		
		OPTIONAL INPUT 2.					
Current BEV Availability	Modeled BEV Range Concerns	Reported BEV Range Concerns (Dropdown)	BEV GHG Emission Reduction Potential	Quality of BEV Candidate	Current PHEV Availability	PHEV GHG Emission Reduction Potential	Quality of PHEV Candidate
1 - Identical BEV	4 - Frequent Public Charging Likely	2 - Some Public Charging Likely	1 - Very High	2 - Good	3 - Consider BEV	2 - High	3 - Consider BEV
1 - Identical BEV	1 - Minimal Public Charging Likely		4 - Moderate	2 - Good	3 - Consider BEV	5 - Limited	3 - Consider BEV
1 - Identical BEV	1 - Minimal Public Charging Likely		1 - Very High	1 - Great	3 - Consider BEV	2 - High	3 - Consider BEV
1 - Identical BEV	2 - Some Public Charging Likely		4 - Moderate	2 - Good	3 - Consider BEV	5 - Limited	3 - Consider BEV
1 - Identical BEV	3 - Unknown	1 - Minimal Public Charging Likely	1 - Very High	1 - Great	3 - Consider BEV	2 - High	3 - Consider BEV
1 - Identical BEV	3 - Unknown		1 - Very High	1 - Great	3 - Consider BEV	2 - High	3 - Consider BEV
2 - Similar BEV	3 - Unknown	1 - Minimal Public Charging Likely	4 - Moderate	2 - Good	3 - Consider BEV	5 - Limited	3 - Consider BEV
4 - Reassess Next Year	5 - Very Frequent Public Charging Likely		1 - Very High	- No FY24 ZEV Optic	4 - Reassess Next Year	2 - High	- No FY24 ZEV Optio
4 - Reassess Next Year	5 - Very Frequent Public Charging Likely		2 - High	- No FY24 ZEV Optic	4 - Reassess Next Year	4 - Moderate	- No FY24 ZEV Optio

Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 2: Evaluate Vehicles and Plan ZEV Acquisitions

FleetDASH AFV Screening Tool Link if Available (Log into FleetDASH; Paste Link into Browser)
FleetDASH LINKFleetDASH LINKFleetDASH LINK
FleetDASH LINKFleetDASH LINKFleetDASH LINK

Vehicles included in FleetDASH have a link to a map displaying fuel transactions and nearby public charging ports.



https://federalfleets.energy.gov/FleetDASH

Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 2: Evaluate Vehicles and Plan ZEV Acquisitions

Fleets estimate vehicle replacement years and which vehicles will be replaced by ZEVs.

Average Vehicle Life		
Weight Class	Leased	Agency-owned
LD	6	10
MD/HD	12	20

Key Input					Decision Point		
INPUT 1. REQUIRED					REQUIRED INPUT 3. ZEV Adoption Plan		
Site Name (Entry Necessary to relate to EVSE Needs & Prioritization Tab)	VIN	Existing Vehicle Type (FAST: VIN Decoded)	Quality of BEV Candidate	Quality of PHEV Candidate	ZEV Preference (Dropdown)	Estimated Year of Replacement	Planned Year of Acquisition (Dropdown)
SITE 2 Parking Lot YY	VIN989	LD Pickup 4x4	2 - Good	3 - Consider BEV	Non-ZEV	2025	2025
SITE 2 Parking Lot YY	VIN1002	LD Pickup 4x4	2 - Good	3 - Consider BEV	BEV	2025	2025
SITE 2 Parking Lot YY	VIN1003	LD Pickup 4x4	1 - Great	3 - Consider BEV	BEV	2025	2025
SITE 2 Parking Lot YY	VIN1004	LD Pickup 4x4	2 - Good	3 - Consider BEV	BEV	2024	2024
SITE 2 Parking Lot YY	VIN1005	MD Pickup	1 - Great	3 - Consider BEV	BEV	2033	2033
SITE 2 Parking Lot YY	VIN1006	MD Pickup	1 - Great	3 - Consider BEV	BEV	2033	2033
SITE 2 Parking Lot YY	VIN1007	MD Pickup	2 - Good	3 - Consider BEV	BEV	2026	2026
SITE 2 Parking Lot YY	VIN1008	LD Van 4x2 (Cargo)	6 - No FY24 ZEV Option	4 - No FY24 ZEV Option	Non-ZEV	2025	2025
SITE 2 Parking Lot YY	VIN1009	LD Van 4x2 (Cargo)	6 - No FY24 ZEV Option	4 - No FY24 ZEV Option	Non-ZEV	2025	2025

Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 3: Evaluate EVSE Needs for ZEV Acquisitions

Fleets evaluate site total planned ZEVs to determine planned ports at a site.

- The impacts of a planned port ratio can be included in planning.

Planned BEV to L2 Port Ratio	2

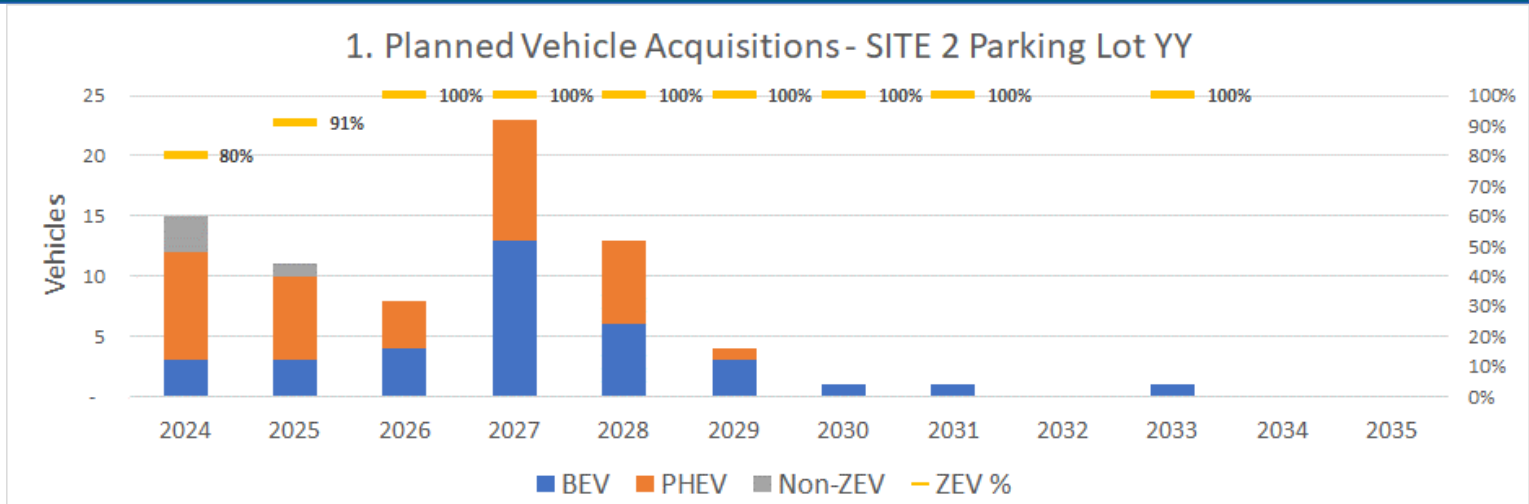
Site Information		BEVs - Level 2 Charging Ports		Level 2 Charging Port Supporting Information			
		INPUT 2. REQUIRED			OPTIONAL INPUT		
Agency	Site Name (Automatically populated)	Existing Fleet Level 2 Charging Ports at Site	Planned Number of Additional Level 2 Charging Ports at Site	Existing Number of Fleet BEVs at Site (from "2. ZEV Selection")	Existing Number of Fleet BEVs at Site (MANUAL UPDATE)	Planned Number of BEVs at Site (from "2. ZEV Selection)	Suggested Additional Level 2 Charging Ports for Planned ZEV Acquisitions
Federal Agency	SITE 2 Parking Lot YY	6	12	-		35	12
Federal Agency	SITE 2 Parking Lot 99	2	14	-		33	15
Federal Agency	SITE 3 Building 22	-	10	-		17	9
Federal Agency	SITE 3 Building 2A	-	12	-		24	12
Federal Agency	SITE 3 Building ZZ	2	14	1		25	11

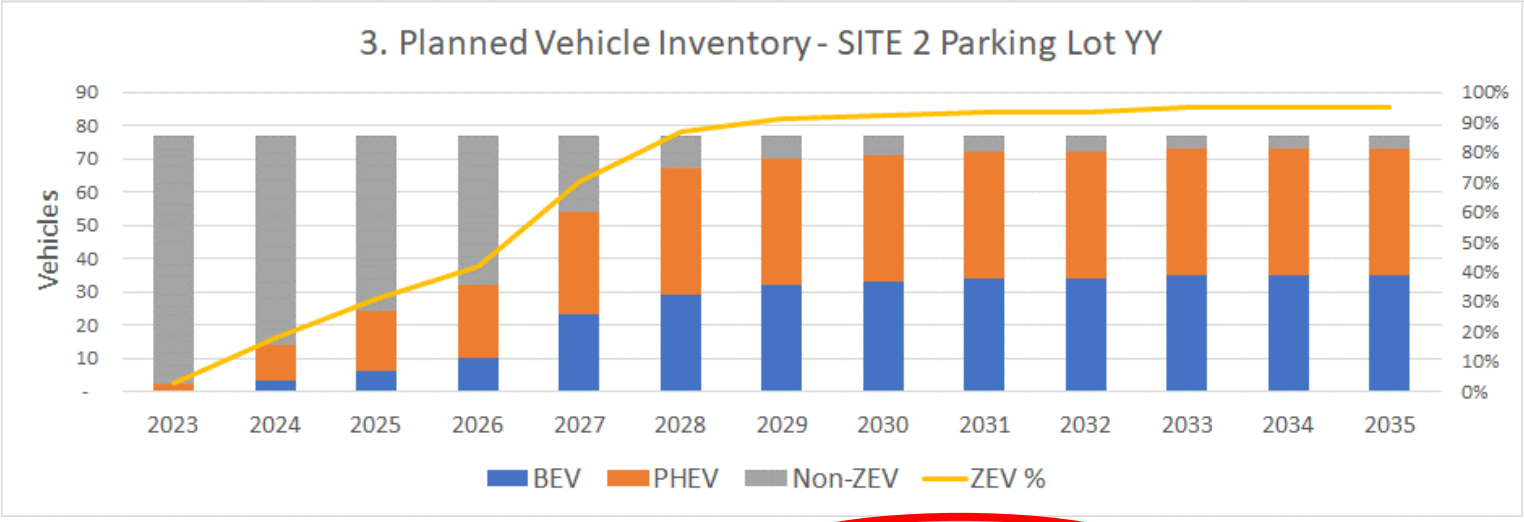
Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

ZPAC Step 4: Evaluate High Level Plan – ZEV Growth

How will annual acquisition decisions affect E.O. 14057 goal attainment?

How will ZEV fleet grow in near and long term?





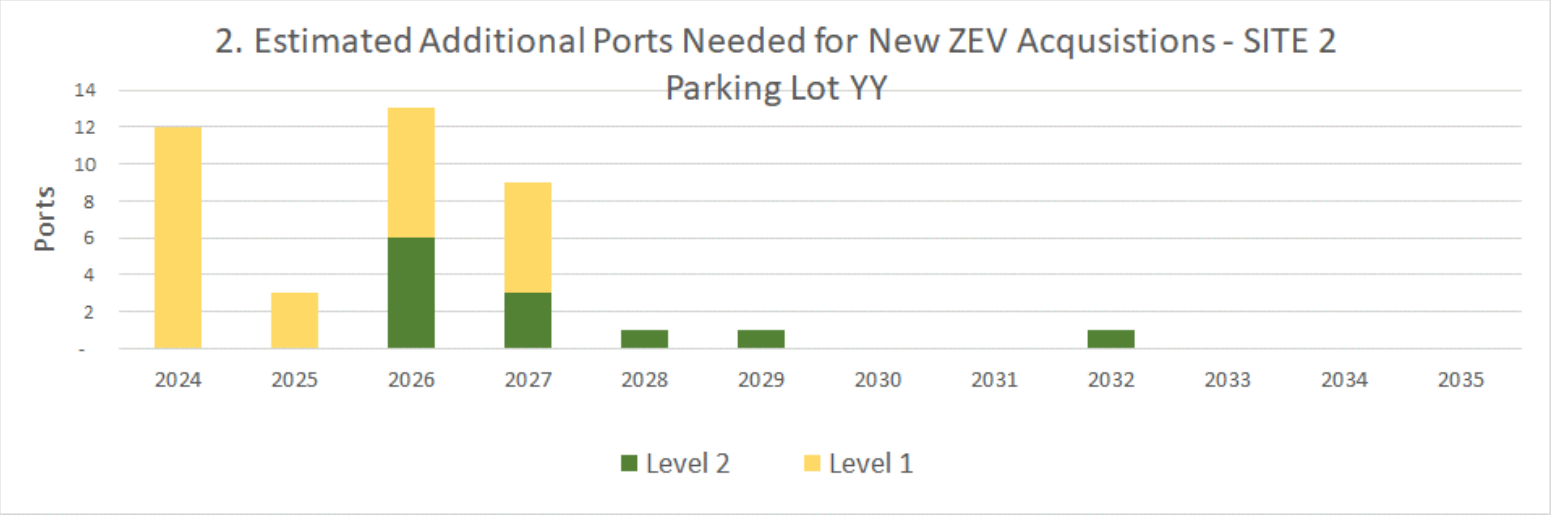
Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

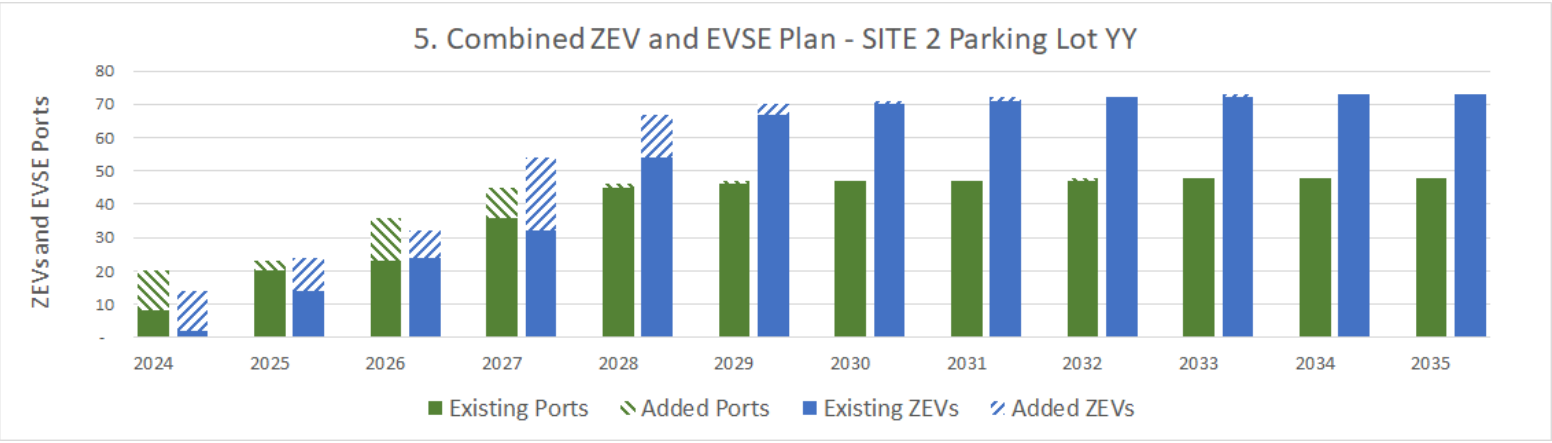
ZPAC Step 4: Evaluate High Level Plan – EVSE Growth

When will new ports need to be installed to support planned ZEV acquisitions?

Note: Fleets should avoid repetitive installation efforts and "stub out" to meet long term electrification goals.

How will ports grow in comparison to ZEVs?





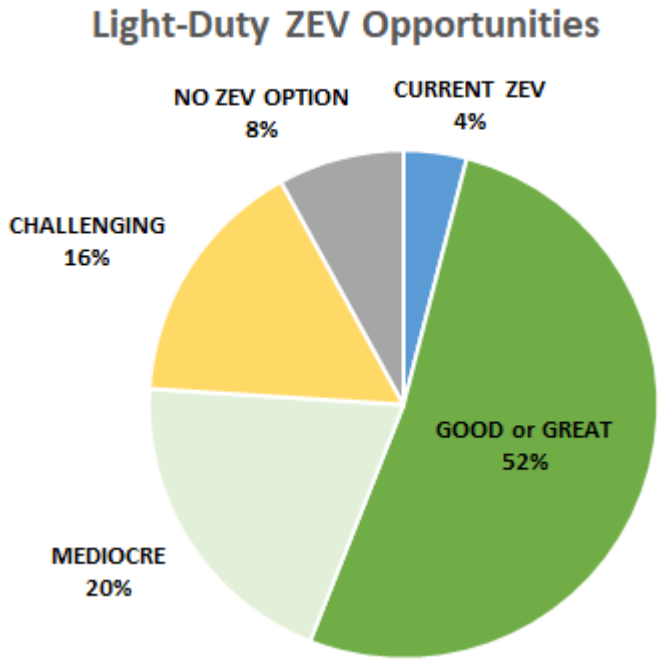
Overview and Background | 1. Identify Locations | 2. ZEV Selection | 3. EVSE Needs & Prioritization | 4. EVSE Site Summary | 5. Annual Plan Summary | 6. Barriers Summary

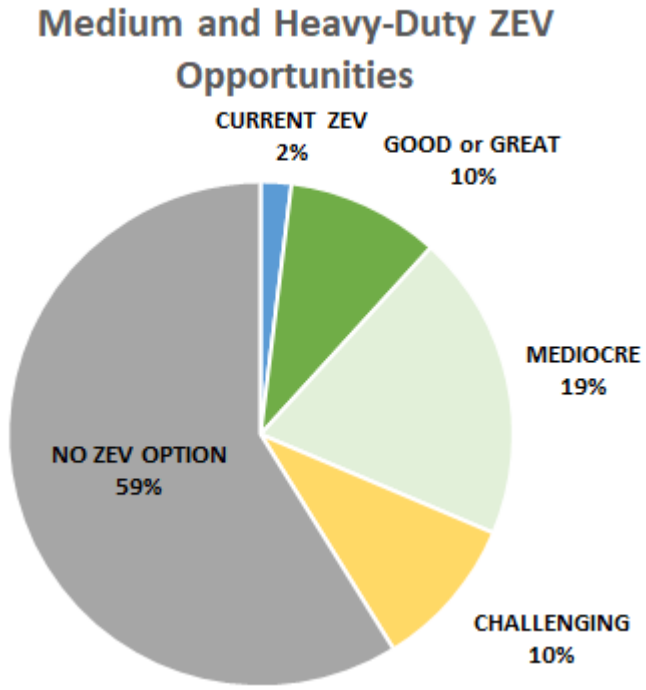
FleetDASH: ZEV Screening Tool – Coming Soon

UNDER DEVELOPMENT

FleetDASH is being updated to include the ZEV Considerations of ZPAC.

Note: A new metric will track the percent of transactions near public charging infrastructure.





	Light Duty Vehicles						
Fleet	Total Vehicles	Current ZEV	Good	Great	Mediocre	Challenging	No ZEV Option
XXXXXXX1							
XXXXXXX2							

https://federalfleets.energy.gov/FleetDASH

Agenda

1. Recap from Training 1 & ZEV Ready Framework
2. Identify and Train Team
3. Align HQ Strategy With Site Planning
4. Identify ZEV Opportunities
5. **Identify EV Charging Infrastructure Needs**
6. Wrap-Up/Q&A

4. Identify EVSE Needs

Level 2: Power Level (kW) = Volts X Amps / 1000

NEC 80% Rule – margin of safety to ensure circuits operate within a safe range

Panel Breakers	EVSE Power Rating	208V	240V
40 Amps	32 Amps	6.7 kW	7.7 kW
50 Amps	40 Amps	8.3 kW	9.6 kW
60 Amps	48 Amps	10.0 kW	11.5 kW
80 Amps	64 Amps	13.3 kW	15.4 kW
100 Amps	80 Amps	16.6 kW	19.2 kW

Load Management

NEC § 625.42 describes how to rate the load of EV charging. It states that "Electric vehicle charging loads shall be considered to be continuous loads"

NEC § 625.42 states: *"Where an **automatic load management system** is used, the maximum equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system."*

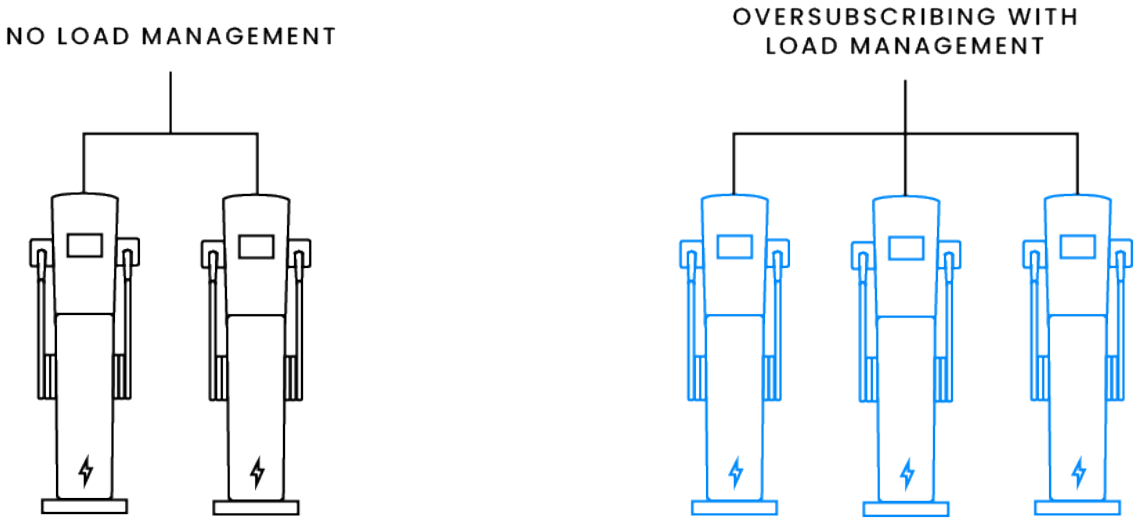
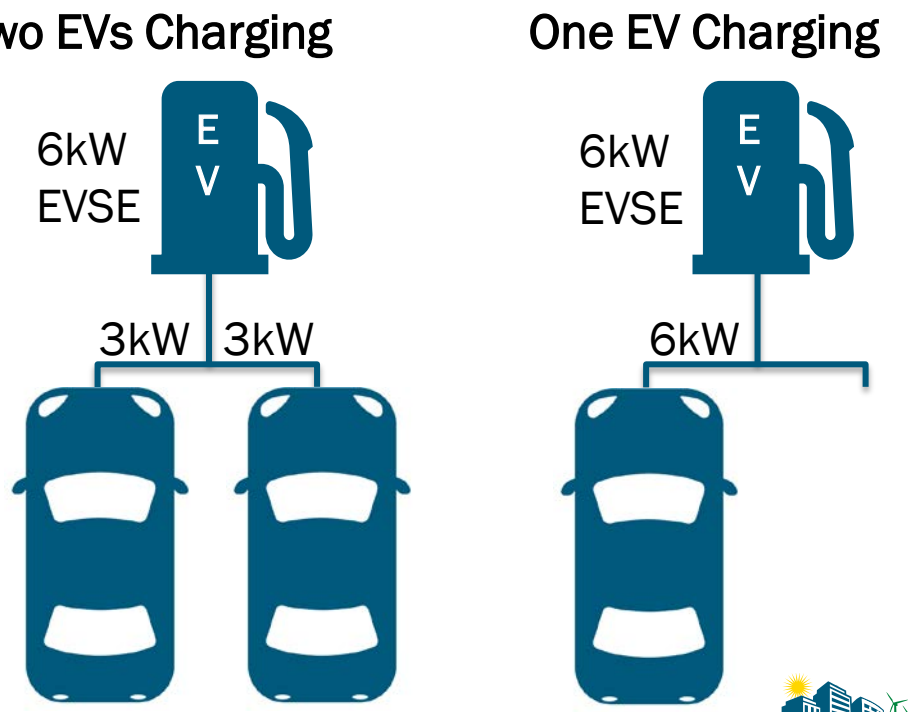


Image Source: https://www.ampcontrol.io/post/clearing-up-confusion-over-electric-vehicles-smart-charging-and-the-nec-80-rule

Power sharing example:



Considerations for Selecting Level 2 Power Rating

Electrical Capacity

EVSE Capabilities

ZEV On-Board Charger

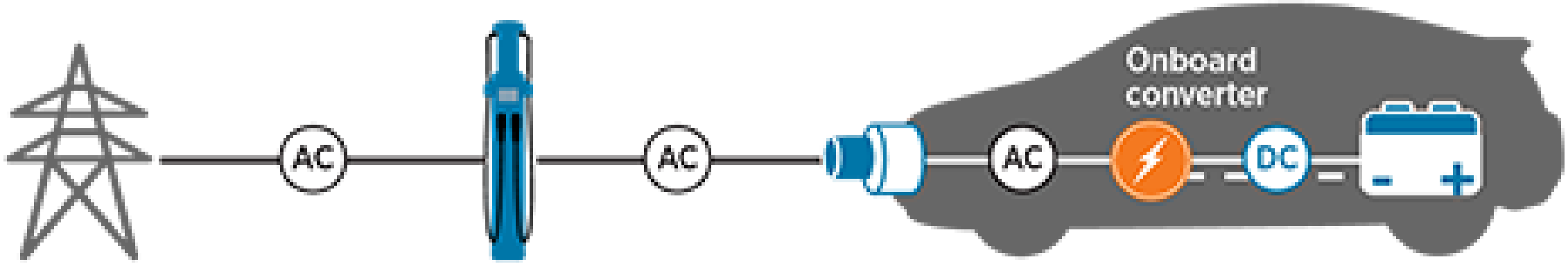


Image Source: https://www.chargepoint.com/blog/whats-difference-between-level-2-ac-charging-and-dc-fast-charging

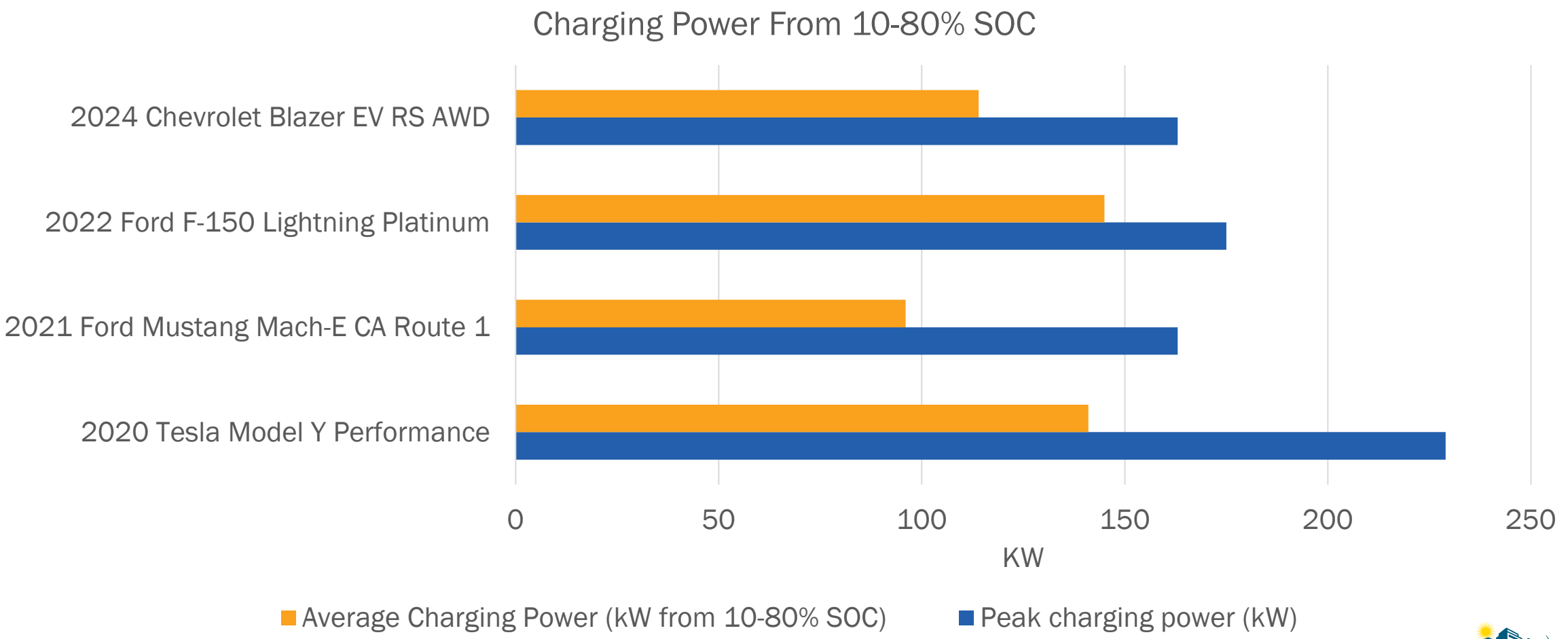
Level 2 Power Ratings – Miles/Hour Charging

Max Level 2 charging level is 19.2 kW, but most vehicles cannot charge above 11.5 kW

Vehicle	Efficiency (kWh/ 100 mi)	On-Board Charger (kW)	Miles Added per Hour Charging			
			6.7 kW	9.6 kW	11.5 kW	19.2 kW
Mitsubishi Outlander	52	3.7	7	7	7	7
Chrysler Pacifica	41	6.6	16	16	16	16
Chevrolet Bolt	28	11.5	24	34	41	41
Chevrolet Blazer	35	11.5	19	27	33	33
Ford F150	49	19.2	14	20	23	39
Ford Mach-E	36	10.5	19	27	29	29
Tesla Model Y	28	11.5	24	34	41	41

DC Fast Charging Speeds Vary By Vehicle Make/Model

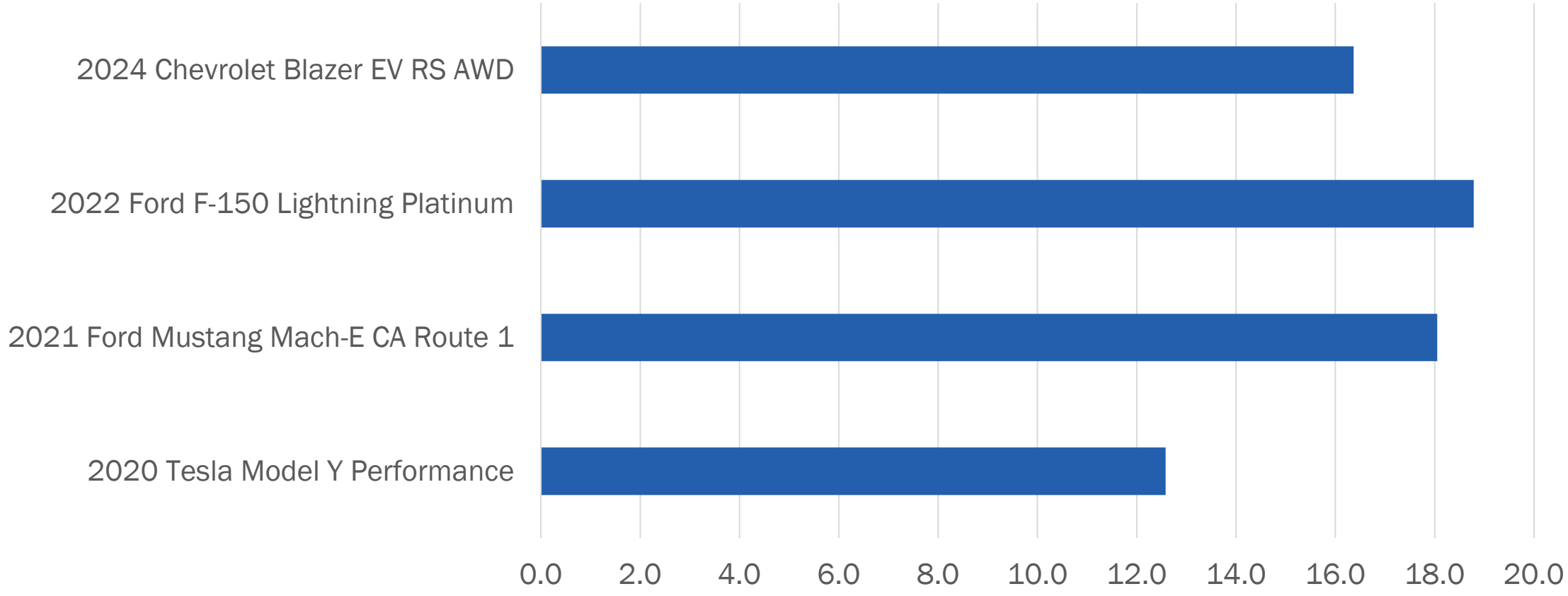
Edmunds EV Charging Test: Average and Peak Charging Power



Source: https://www.edmunds.com/car-news/electric-car-charging.html

DC Fast Charging Speeds Vary By Vehicle Make/Model

Edmunds EV Charging Test: Average Time to Add 100 Miles of Range (Min.)



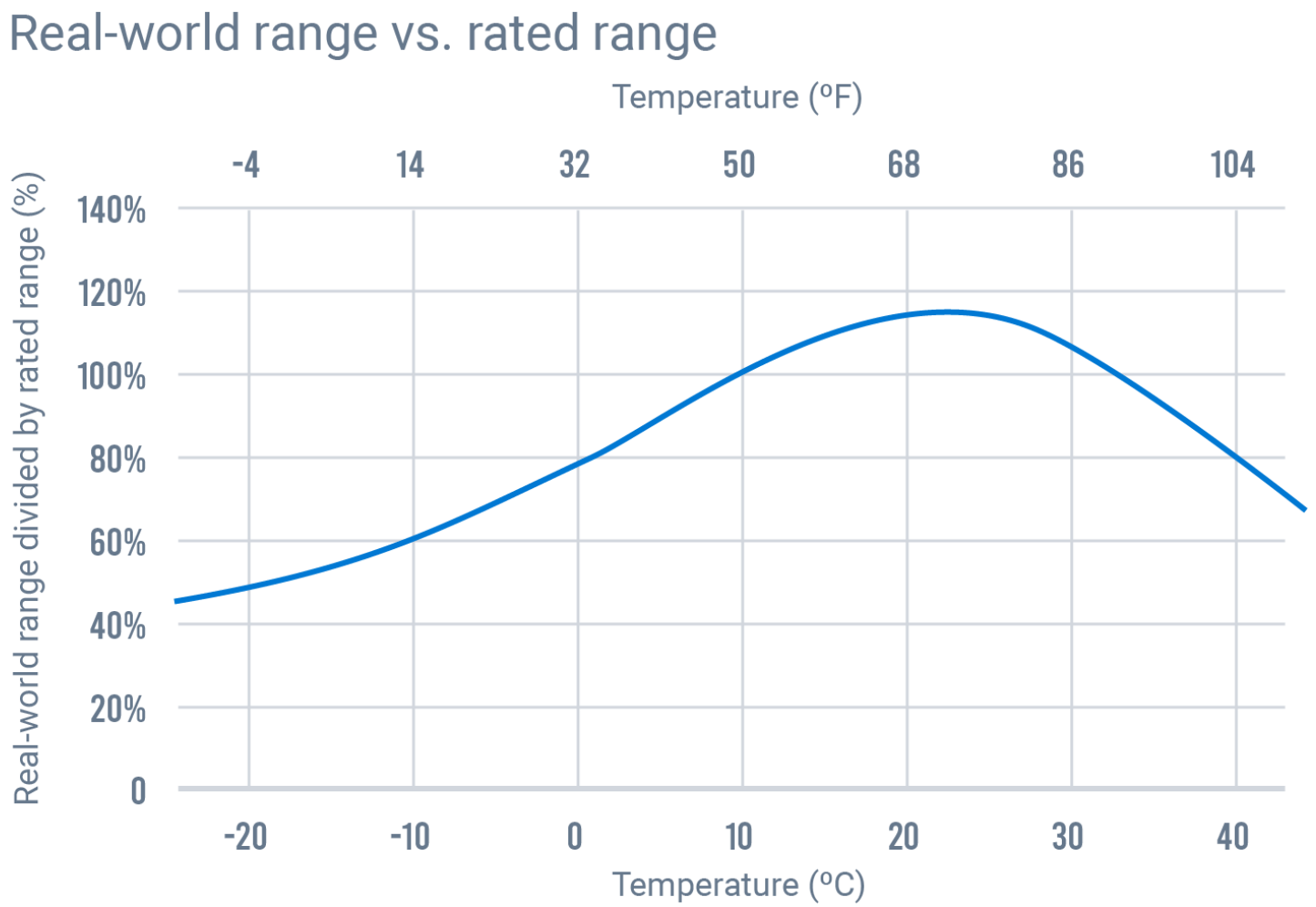
Source: https://www.edmunds.com/car-news/electric-car-charging.html

Weather Impact on Range

Optimal operating temperature is ~70°

Temperature impacts are vehicle dependent

During extreme cold weather, EV range may decrease ~50% of the rated range



Source: Geotab https://www.geotab.com/blog/ev-range/

Steps to Identify EV Charging Station Needs

1 – Group ZEVs by where they park

2 – Determine the duration the ZEV needs to charge

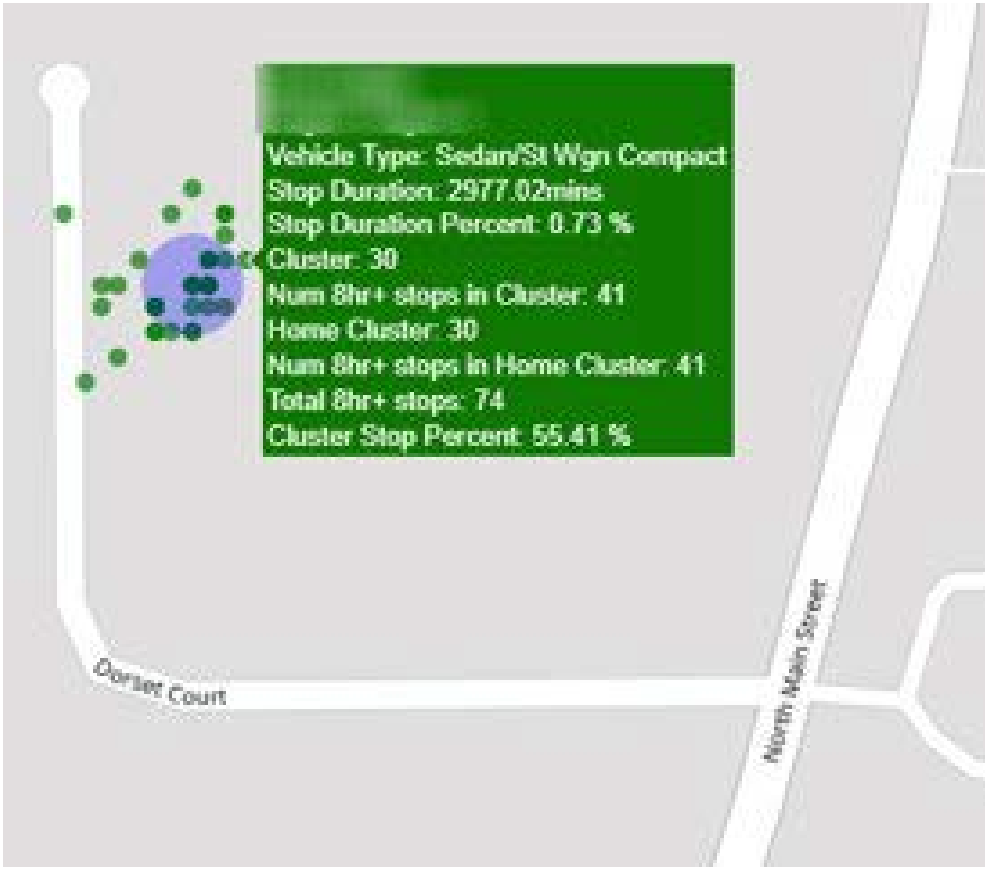
3 – Identify what type of EV charging is needed

4 – Determine an EV:EVSE ratio by project area

5 – Consider futureproofing opportunities

1 – Group ZEVs By Where They Park

- Create EV charging station “projects” for the parking areas where ZEVs will or could park
- Use telematics or your fleet management information system to group vehicles



2 – Determine the Duration the ZEV Needs to Charge

For each vehicle in the project area, look at the following information:

Battery size/range for ZEV replacement (BEV vs. PHEV)

How many miles the vehicle travels and how it compares to the ZEV replacement range

Vehicle dwell periods

Available parking and flexibility to move ZEV after charging is complete

How often does each fleet vehicle need to charge?

3 – Identify What Type of EV Charging Is Needed

When calculating the EV charging power level needed to support fleet vehicles, consider:

- Rarely will a vehicle need to charge from 0–100%
- For vehicles relying on overnight charging, Level 1 or 2 charging is often sufficient
- For vehicles that need on-site midday charging, DC fast charging may be needed

$$Power\ (kW) = \frac{Energy\ (kWh)}{Dwell\ Time\ (hours)}$$

4 – Determine an EV:EVSE Ratio by Project Area

For each project area, how many EVSE ports are needed to support the ZEVs?

Ratio	Pros	Cons
1:1 	• Dedicated plan to charge • May be easier for drivers to plug in each day (behavior change)	• More expensive • Potential for over-building if vehicles do not need to charge every day
>1:1 	• Reduce EV charging station project costs	• May require more administrative work to coordinate when vehicles need to charge

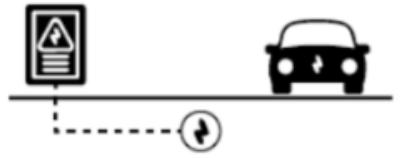
5 – Consider Futureproofing Opportunities

Considerations:

- Timeline for replacing the ZEV (what is needed in the next two years vs. further out in the future)
- Add extra capacity in a service panel/transformer upgrade or extra conduit to reduce future site work

EV-Capable Parking Space: Electrical Panel Capacity & Conduit

- Install panel capacity and conduit (raceway) to accommodate the future build-out of EV charging with 208/240 V, 40-amp circuits.
- Rational: Provide hard-to-retrofit elements during new construction while minimizing up-front cost.

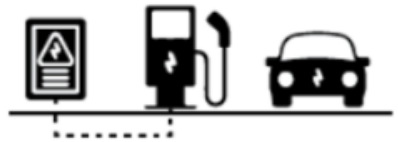


EV-Ready Parking Space: Install full circuit

- Full circuit installations include 208/240V, 40-amp panel capacity, raceway, wiring, receptable, and overprotection devices similar to a dryer circuit.
- Rational: Full circuits are plug-and-play ready and minimize total costs and additional barriers to installing Electric Vehicle Supply Equipment (EVSE).

EV-Installed: Install EV Charging Station (also known as Electric Vehicle Supply Equipment or EVSE).

- Install charging stations during new construction.
- Rational: Provide a visible signal that building supports EV charging and reduce future EV charger installation costs to zero.



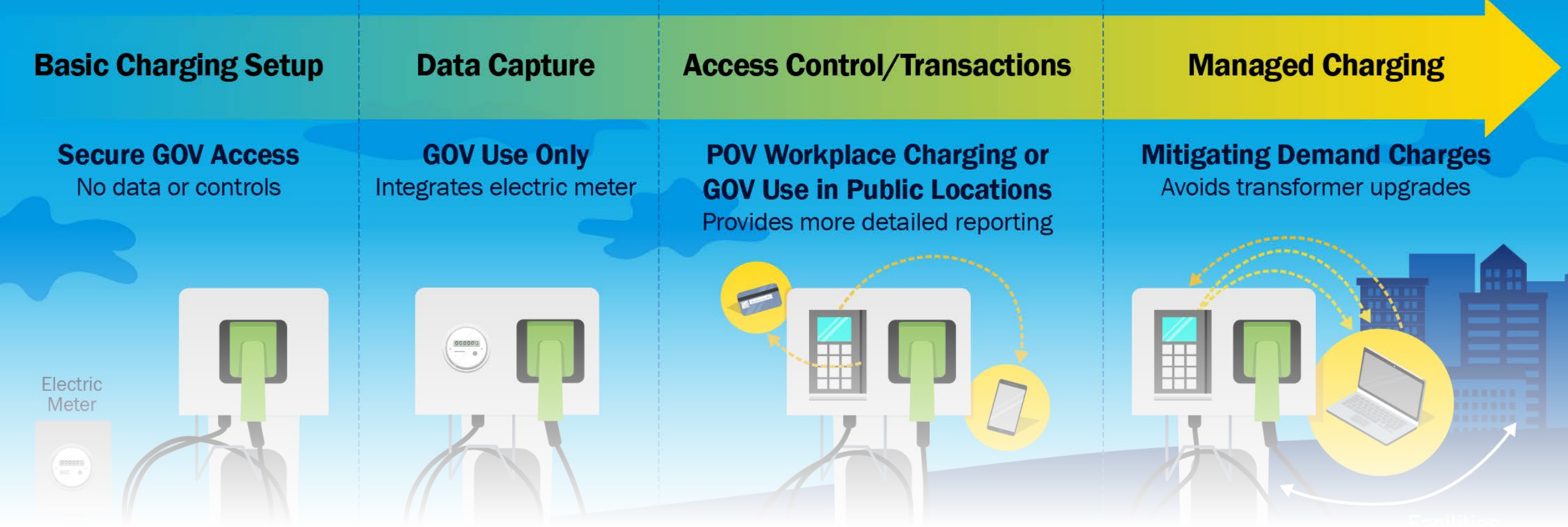
Source: https://afdc.energy.gov/fuels/electricity-codes-and-ordinances

Decide Who Has Access to EV Charging Stations

Image Source: https://www.chargepoint.com/blog/whats-difference-between-level-2-ac-charging-and-dc-fast-charging

EV charging station access levels differ based on who can use the charging station (fleet-only, employee-only, shared, other)

The primary EV charging station access decision at most federal locations is whether employee charging access for employee privately owned vehicles (POVs) will be permitted (workplace charging)



- A networked EVSE has built-in data management or metering capabilities that track the energy use
  - Commonly provides the ability to process payment transactions, control vehicle access, track charging session data, and manage charging
- EVSE and network plans can be purchased via the GSA BPA

Comparing Networked vs. Non-Networked EVSEs

	Networked	Non-Networked
Payment	Can collect payment	Can't collect payment
Data Tracking	Tracks/reports charging session level data	Does not track/report on charging data
Connectivity	Requires connectivity (e.g., cellular service); connectivity issues can disrupt service	No connectivity required
Load Management	Load management capabilities (complexity will vary)	No load management capabilities outside of power sharing
Costs	Higher upfront and ongoing costs	Lower upfront and ongoing costs

Best Practices for Identifying EVSE Needs

- Determine the required scale and type of EV charging stations before assessing feasibility and cost
- Ensure charging infrastructure is ready before ZEV delivery
- Design with optimal EV:EVSE ratios based on site-level fleet needs
- Plan for future Level 2 and DC Fast charging, including medium- and heavy-duty vehicle charging needs

Workplace Charging Considerations

Federal Workplace Charging Program Guide

A document prepared by the FEMP Fleet Team to provide:

- Example workplace charging program structure
- Steps to plan for and implement a new agency-wide program
- Example fee structure and calculations to recoup all program costs
- Industry best practices for steps such as charger installation and fee collection

https://www.energy.gov/sites/default/files/2020/11/f80/federal-workplace-charging-guide.pdf

Program Roadmap

The document outlines a basic roadmap to develop a successful Workplace Charging Program with planning tools and key advice

- Assemble Team
- Develop Plan
- Install EV Charging Stations
- Oversee Program

Workplace charging program roadmap
Illustration by Anthony Castellano, NREL

Estimating Workplace EV Charging Station Demand

Employee Survey

- Assess the current and future demand for workplace charging with an employee survey
- Example Survey is provided in Appendix B of the Workplace Charging Guide

Shared Use

- May be opportunities to use charging stations for both fleet and employee charging
- Locations where both employees and fleet vehicles park are ideal for shared use

Fee Collection

FAST Act Sec. 1413 § 151

- Authorizes agencies to provide workplace charging at a no-cost basis to the government
- Requires charger installation costs be recouped over time

Fee Collection Options

- Third-party vendor
- Treasury pay.gov
- Payroll deduction

Workplace Charging Fee Structure

Typical workplace charging costs to account for when designing a charging fee:

Electricity Fee

Recoup the cost of electricity as a result of EV charging

Network Fee

Cover the networking and connection fees required for advanced EVSE units

Unit Fee

Recoup the cost of the EVSE over the expected life of the unit

Installation Fee

Recoup the cost of the installation over the expected life of the infrastructure

FEMP Workplace Charging Fee Calculator:

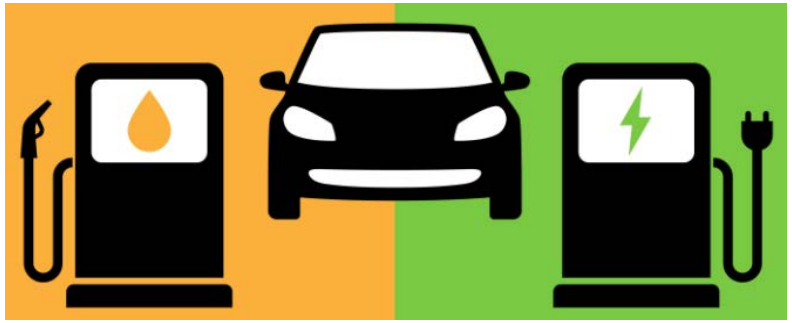
https://www.energy.gov/sites/default/files/2020/11/f80/femp-workplace-charging-fee-calculator.xlsx

Planning for Medium-Duty/Heavy-Duty Vehicles

Medium-Duty/Heavy-Duty Transition Challenges

Fleet Electrification Is Challenging

- **Medium-Duty (MD)/Heavy-Duty (HD) BEVs are constrained by the driving range of the battery and the time required to recharge the battery**
  - EVs rely on a battery to store and deliver the energy needed to propel the vehicle; therefore, determining the battery size is vital
  - Current technology may have limitations depending on the driving range and environmental conditions (heat, cold, terrain)
  - Currently available MD and HD BEV ranges vary dramatically by vehicle class



- **New infrastructure is typically required and depends on many factors**
  - Determining charger station locations (Where can they be placed?)
  - Operational considerations (When will you need to charge? Modify duties/routes?)
  - Costs depend on several factors, including type of charger (Level 1, Level 2, DC Fast Charger)
  - Overnight charging: 4 to 8 hours

- **How can I decide if a fleet can transition successfully as electric?**
  - Depending on the application, various levels of data can help answer these questions

Initial Data – Planning Considerations

Develop vehicle specifications to meet operational requirements:

- **Basic strategies**
  - Validation: If available, use initial fleet statistics (annual miles, annual fuel consumption) to determine if EVs can be applicable to a given fleet
  - Identify best routes for EV design
  - Develop vehicle specifications to enable full or partial electrification of most routes
    - Calculate battery size
  - Vehicle modeling and simulation tools are helpful to make informed choices
- **Select charging strategy and plan early for charging infrastructure**
  - Charger locations
  - Plug-in at depot
  - On-route fast charge (type of chargers)

General considerations for the MD/HD EV sector

- Medium-duty EV
  - Emerging product offerings, supply network
  - Expected to develop/expand in a 2- to 5-year timeframe
  - Fleet pickups and vans often require specialty "work" functions that consume additional energy or have special requirements beyond the base vehicle package
- **Heavy-duty EV**
  - Emerging product offerings, supply network
  - Expanded EV products expected in a 2- to 5-year timeframe
  - Higher charging power/infrastructure investment
  - Good opportunity for limited demonstration
  - Potential lessons learned from transit EV applications

Initial Data – What Is Recommended to Evaluate Your Fleet

What data should you initially analyze?

- Inventory/log of the vehicles, including:
  - Vehicle ID number?
  - Number of vehicles (preferably by type)
  - Vehicle make and model year?
  - Engine make and model year?
  - Gross vehicle weight rating?
  - Miles traveled (annually, daily)?
  - Annual fuel consumption for each vehicle?
  - Fuel economy for each vehicle?
  - What is the primary service application for this vehicle?
  - Does the vehicle return to base each day?
  - Where are vehicles parked/housed?
  - Where are vehicles refueled?
  - Where are vehicles maintained?

The **most** vital data needs are highlighted.

- Vehicle make and model year:
  - Helps classify vehicle types to efficiently determine high-level statistics
  - Older vehicles emit more carbon dioxide vs. newer vehicles (usually higher priority)
- Attributes such as daily/annual miles and primary service application can help infer if a vehicle is a candidate for electrification
  - Vehicles that drive short distances are typically easier to electrify
  - Fuel consumption can assist in determining which vehicle types produce the most emissions in the fleet, which may be higher priority
- Gross vehicle weight rating is an important factor since heavier vehicles that haul cargo require more power (however, if the primary service application is known, this may not be needed)

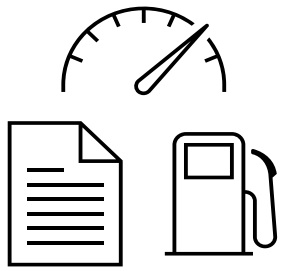
Levels of Data Collection

In some cases, the initial data available from the fleet can be inconclusive or require additional analysis for certain vehicle types

How can data loggers be useful?

- **GPS Data:**
  - Vehicle modeling, frequent routes/stops
  - Use speed traces to determine when/how long the vehicle is idling
    - Charger station locations and type of chargers
- **GPS + CAN:**
  - Verify average speeds, daily distances
  - Battery sizing, energy usage
  - Vehicle idling: charging station locations and type of charger (Level 1, Level 2, DCFC)
  - Vehicle modeling inputs
- **Validate Initial Results** (when utilizing only mileage/fueling records)

GPS = Global Positioning System (used for location and speed)
CAN = Controller Area Network (used for vehicle diagnostics)



Mileage/Fueling Records (Initial Data)

Global Positioning System (GPS)

GPS + Select CAN

GPS + Full CAN

What Data Do We Collect?

300+ CAN and GPS Data Loggers

Data: Speed, Fueling, Power, etc.

Timeline: ~4 weeks of collection per vehicle

Process: Installation 5-10 min/vehicle

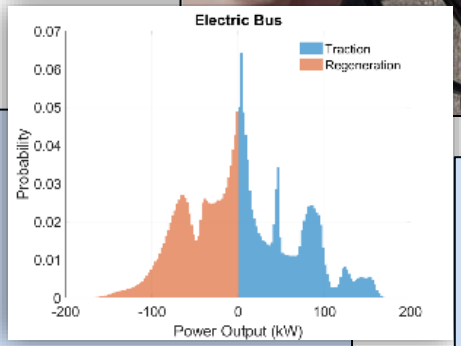
- Data is stored locally and downloaded when the logger is removed (unless a cellular modem is used—this is not typically needed).

GPS and Route Data

- Latitude / Longitude
- Elevation
- Route Profiles
- Time / Speed
- Ambient Conditions

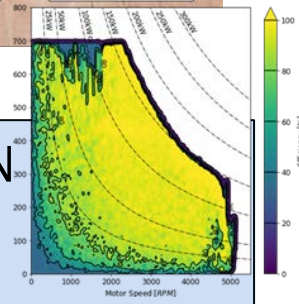
Derived Parameters

- Vehicle Speed Statistics
- Acceleration / Deceleration Rates
- Idle Time
- Road Grade
- Drive Cycles



Electric Drive

- Battery SOC
- Voltage
- Current
- Temperatures
- Component Temperatures
- Derived Parameters
- In-use efficiency
- Energy demand / Range
- Power / SOC cycles
- Charge profiles



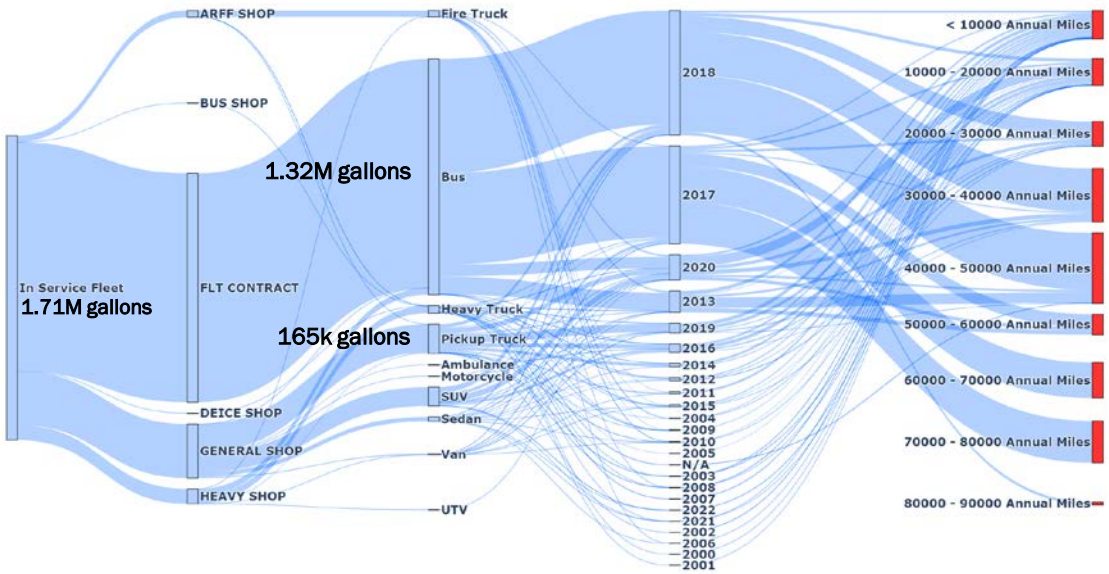
Vehicle and Engine CAN

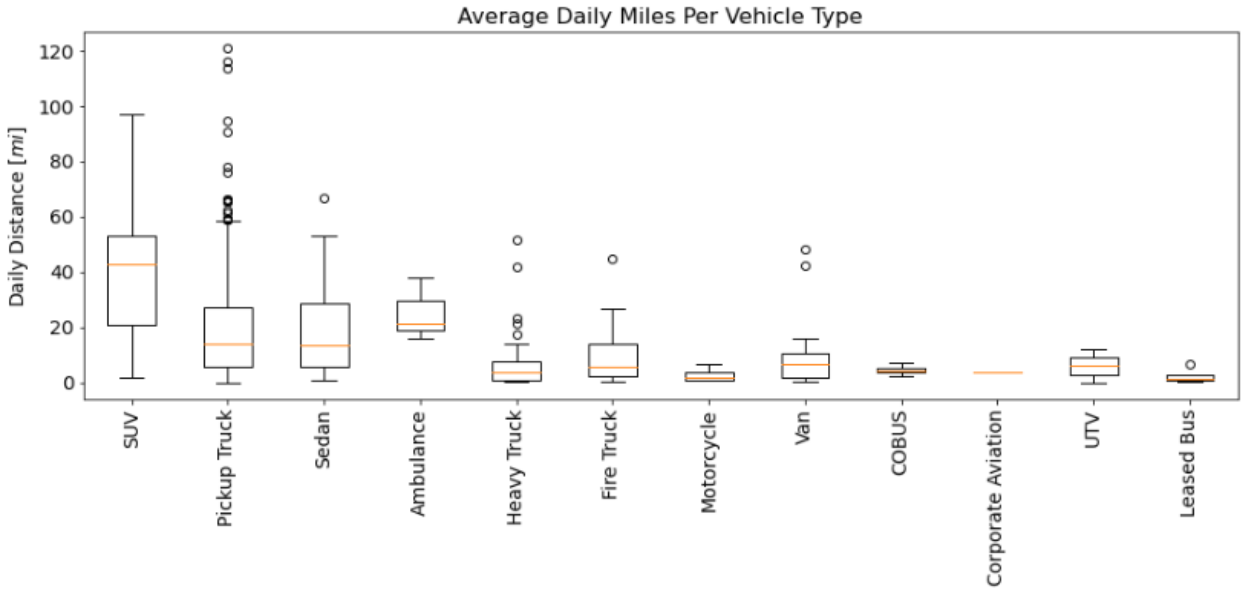
- Engine Speed / Torque
- Engine Fuel Rate
- NO_X Sensor
- Exhaust Temperatures
- Engine Coolant and Oil Temperatures…
- Derived Parameters
- Power Demand
- In-use Fuel Economy / Consumption
- In-use Engine Maps

Initial Data – Analysis

If the attributes highlighted from the earlier slides are available, we can produce various plots and calculate statistics that would help aid the decision on whether the fleet can successfully operate as an electric fleet

- Calculate average and maximum daily miles for each vehicle type
  - Results can be shown using a box-whisker plot for more effective decision-making
    - Orange line indicates the average, the two bars on either side of the box are minimum and maximum values in the dataset, and the circles represent outliers
- Fuel Consumption + Fueling Locations
  - Determine which vehicle types have the largest fuel consumption (gallons); a Sankey Diagram (shown on the left) is utilized to display the vehicle type, respective vehicle year, and annual miles (range)
  - Fuel location information can be used to determine charger locations





Drive Cycle Attributes

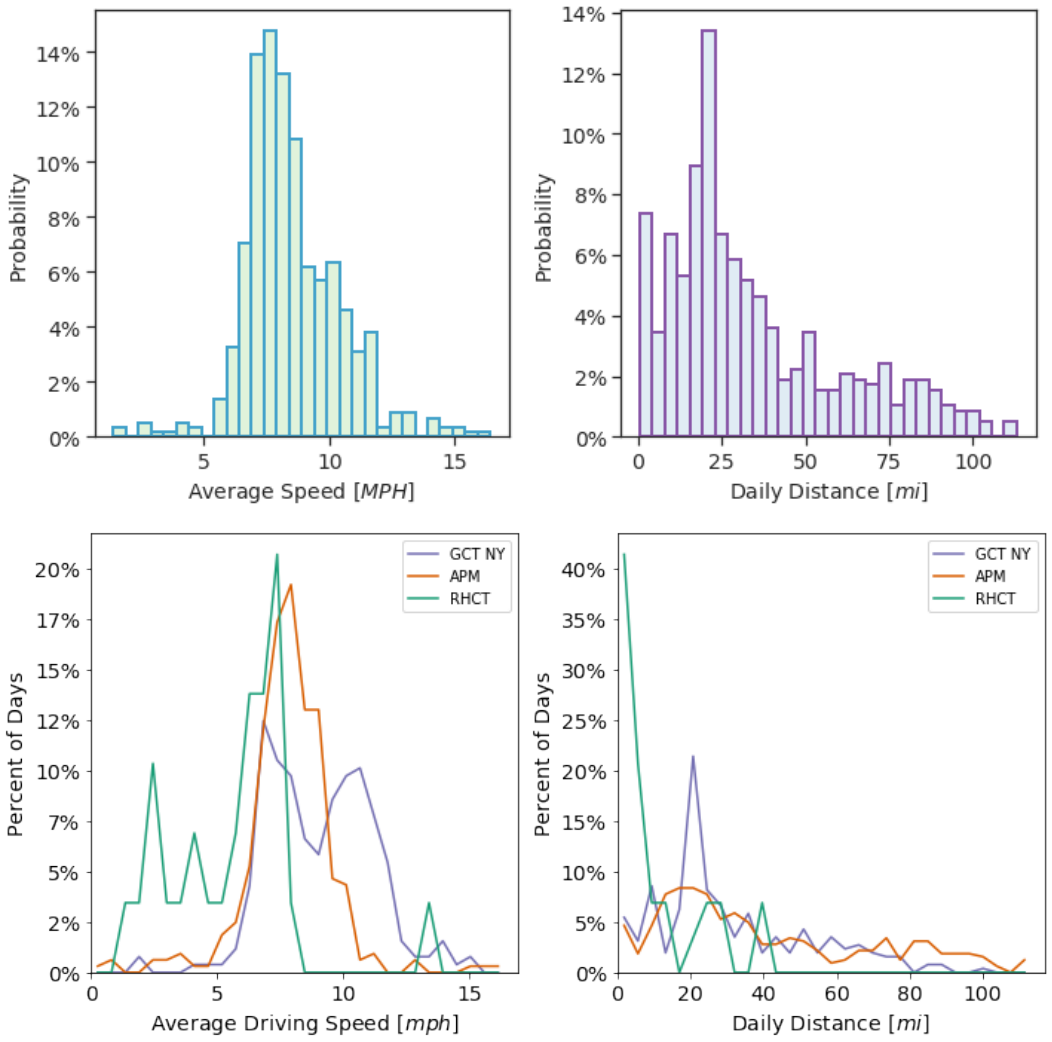
Drive cycle profiles define:

- Distances driven
- Idling, stationary work functions
- Acceleration patterns
- Geographical travel patterns

Tracking vehicles assists in determining:

- Battery size
- Regeneration potential
- Needed charging infrastructure
- Economic payback

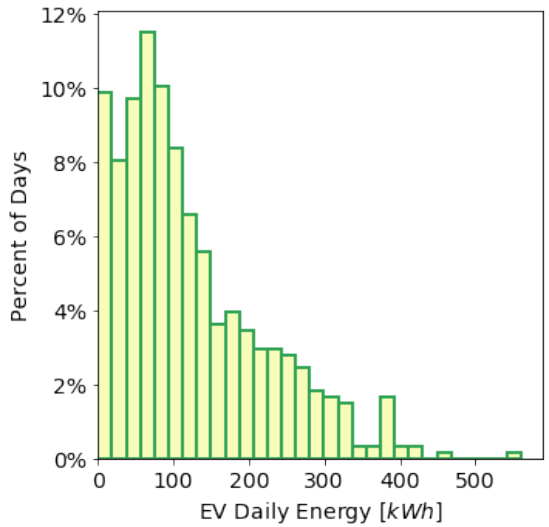
Vehicle speed and location can provide significant information on electrification needs

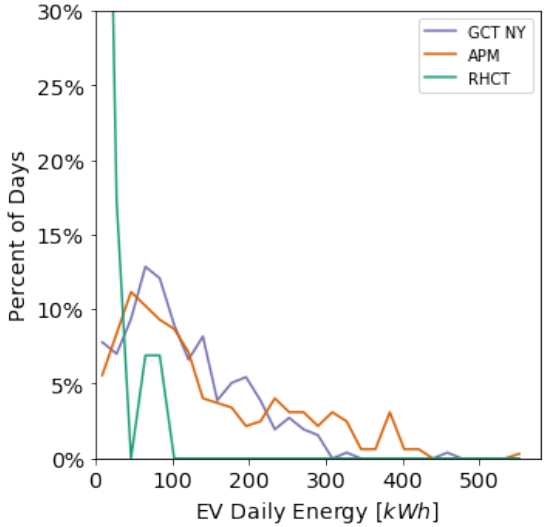


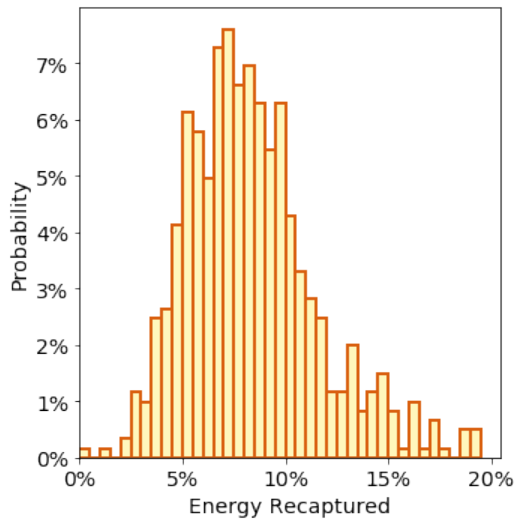
Significance of Vehicle/Engine Attributes

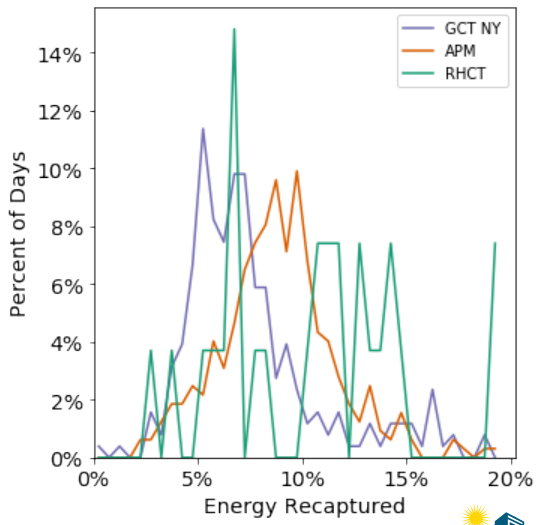
Daily energy use is vital to determine the following:

- Adequate battery size
- Impacts from auxiliary loads (heating and air conditioning in the vehicle, work functions)
  - Location dependent (climate), which can increase/decrease energy usage
- Highway driving vs. city driving (energy recapture)
  - Highway driving: Fewer events of regenerative braking, higher energy usage at higher speeds
  - City driving: More events of regenerative braking, lower speeds





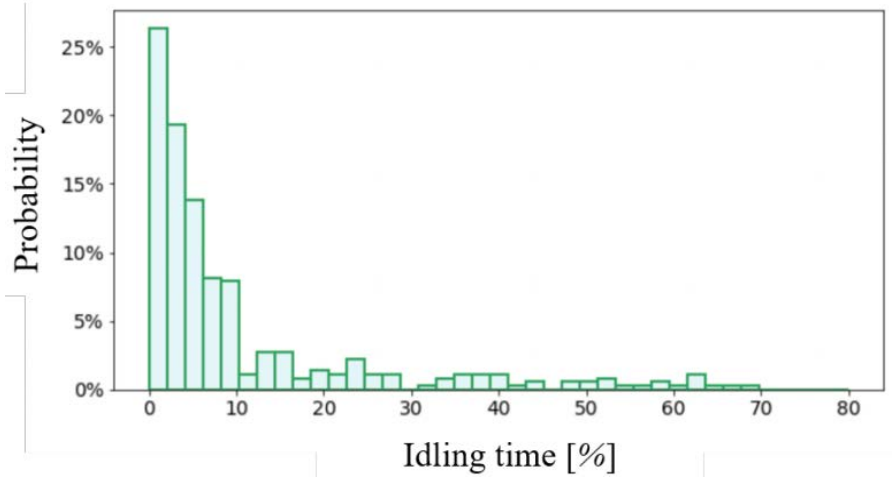




Significance of Geospatial Data

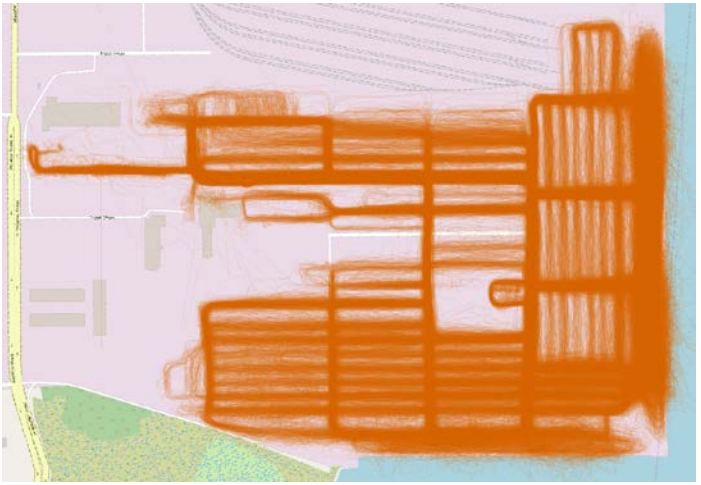
Data files of value:

- Drive cycles reflecting more stop-and-start driving provide better opportunities for electric-drive vehicles that can **recapture energy during braking**
- Drive traces are also utilized for geospatial charger placement location identification by analyzing driving patterns (e.g., vehicle idling)
- Residential and commercial zoning can be helpful to showcase commuting patterns within a city and identify potential EV supply equipment (EVSE) hosts
- Traffic volume maps help planners estimate how many EVs could potentially drive along given road segments
  - May need to modify routes based on the demand
- Utility feeder maps, ideally tied to feeder capacity data, can help ensure that high-powered chargers are installed in locations **where the grid can best handle additional load.**



Redhook Terminal (RHCT)

APM Terminals (APM)

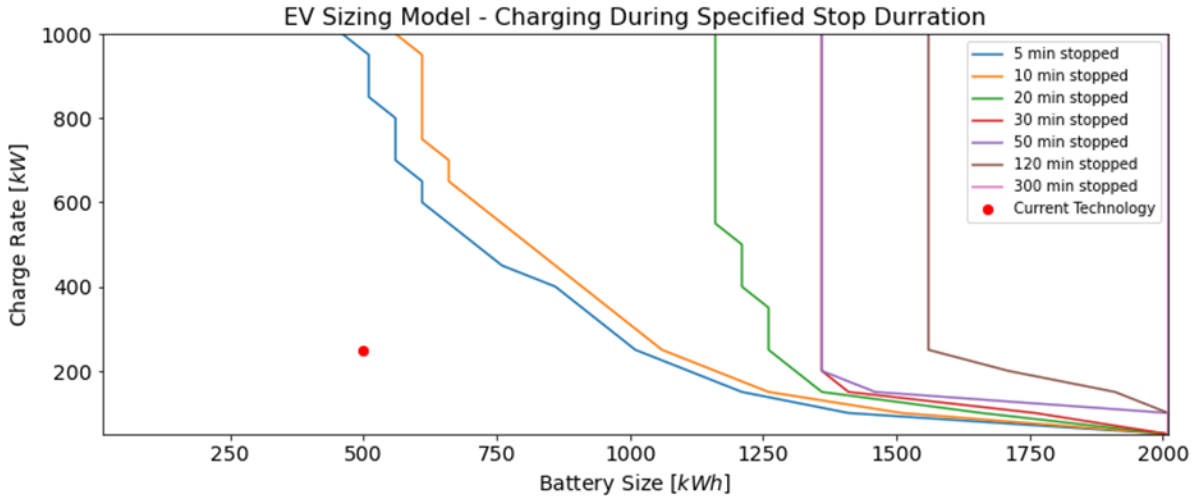


19,767,600 data points
Darker lines = More frequent trips

Vehicle Battery Size

Why do we need to estimate the battery size?

- To determine which marketable EV could be a possible replacement for the vehicle in question
- To use as an input for vehicle modeling for route viability (can the vehicle complete the route or partially?)
- To determine which types of chargers to use (larger battery sizes take longer to charge)



Larger battery sizes are typically more expensive and heavier

- Longer driving range
- Take longer to charge
- Possibly lower cargo capacity

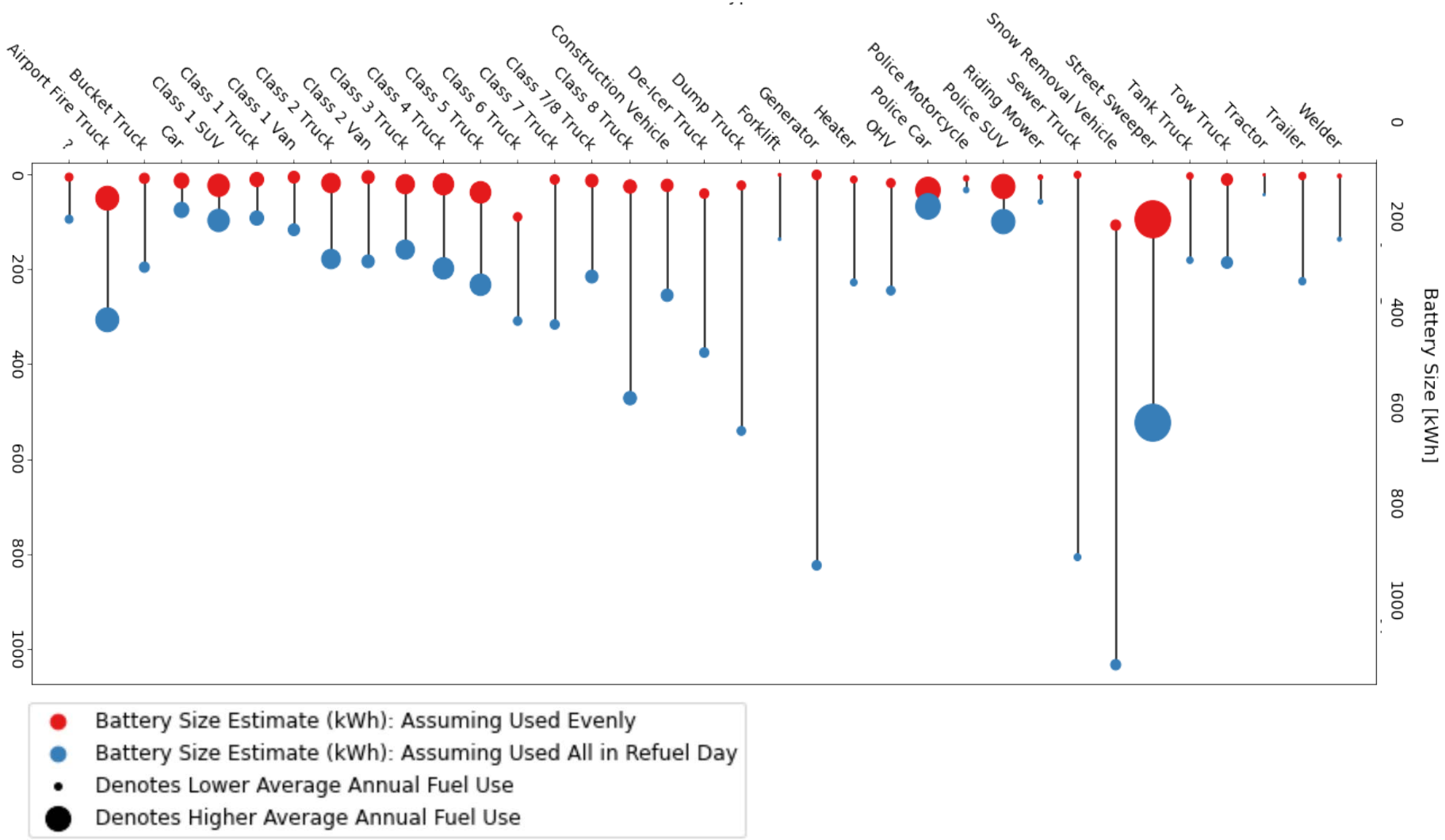
Equation to estimate the battery size (kWh) required if vehicles were electric:

$$Battery\ Size\ (kWh) = daily\ amount\ fuel\ used * thermal\ efficiency * energy\ content$$

- If type of fuel used is gasoline: 27% thermal efficiency and energy content 33.4 kWh/gal
- If type of fuel used is diesel: 33% thermal efficiency and energy content 37.6 kWh/gal

Vehicle Battery Sizing Examples

$$\textbf{Battery Size (kWh)} = \textbf{daily amount fuel used} * \textbf{thermal efficiency} * \textbf{energy content}$$



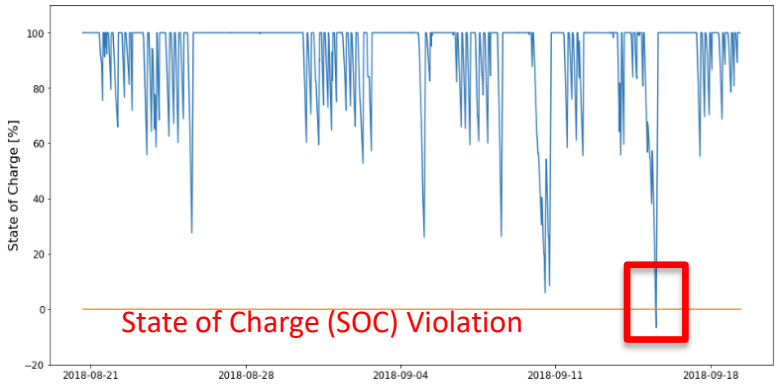
Used fueling records to estimate battery size

Vehicle Battery Sizing Examples

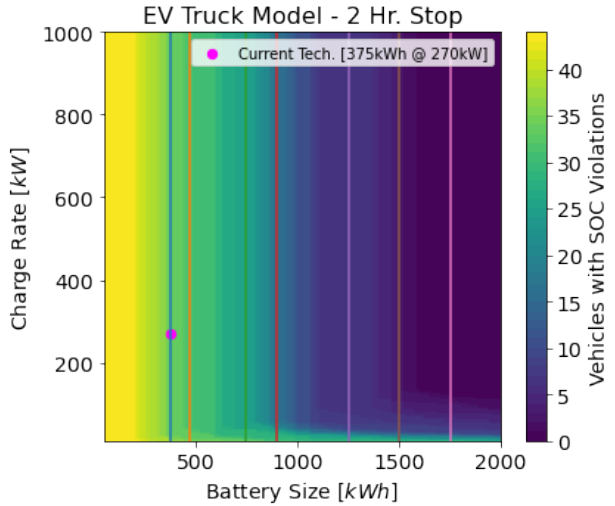
Model vehicle using detailed GPS data

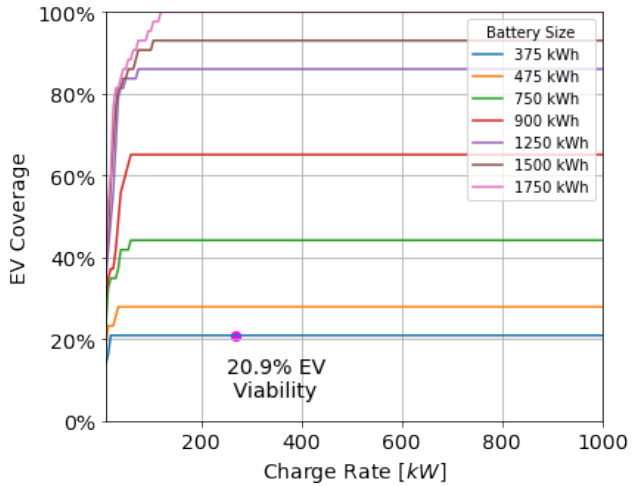
- Model assumes vehicle can charge if stopped for given amount of time or longer
- Tractor trailer application
- Used Freightliner eCascadia vehicle as model

eCascadia Specs	
Class	8
Power	360-500 HP
GCWR	82,000 lbs
Range	250 Miles
Battery	375 kWh (usable)
Charge	270 kW

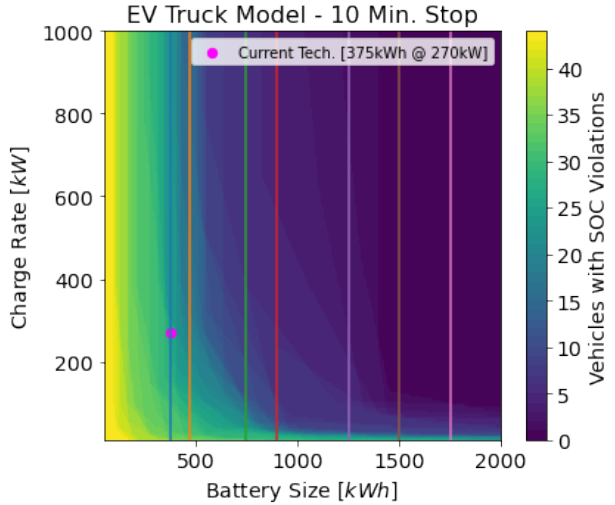


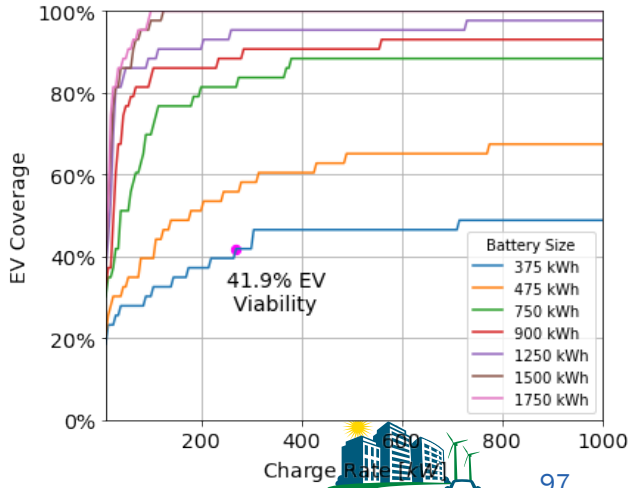
Minimal Operational Changes





Moderate Operational Changes





Agenda

1. Recap from Training 1 & ZEV Ready Framework
2. Identify and Train Team
3. Align HQ Strategy With Site Planning
4. Identify ZEV Opportunities
5. Identify EV Charging Infrastructure Needs
6. **Wrap-Up/Q&A**

Questions?

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FEMP
Federal Energy Management Program

Notable Tools and Resources

FEMP Fleet Electrification and Optimization website

- https://www.energy.gov/femp/fleet-electrification-and-optimization

Federal Fleet ZEV Ready Center

- https://www.energy.gov/femp/federal-fleet-zev-ready-center

Federal Fleet EV Training

- https://www.youtube.com/playlist?list=PLmIn8Hncs7bEa_NOG5Y8EZyONoxJtT0EF

GSA 2024 Zero Emission Vehicle Fact Sheet

- https://www.gsa.gov/system/files/FY2024%20GSA%20ZEV%20Fact%20Sheet_3.18.2024_508.pdf

DOE's AFDC Electric Vehicles

- https://afdc.energy.gov/vehicles/electric.html

U-Finder

- https://afdc.energy.gov/utility-finder

EVI-LOCATE

- https://evi-locate.nrel.gov/

FuelEconomy.Gov

- https://fueleconomy.gov/

Register Today For Upcoming EV Champion Training

EV Champion Training Series	Date and Time
Training 1: ZEV and EV Charging Fundamentals	Thurs., Aug. 29, 12–2 p.m. ET
Training 2: ZEV and EV Charging Planning	Wed., Sept. 11, 2–4 p.m. ET
Training 3: EV Charging Site Assessments and Budgeting	Wed., Sept. 18, 2–4 p.m. ET
Training 4: EV and EV Charging Design and Implementation	Wed., Oct. 2, 2–4 p.m. ET

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