North Central Texas Council of Governments

Regional Transportation Council

SMARTE
Saving Money and Reducing Truck Emissions

Saving Money and Reducing Truck Emissions Webinar Series

TCO Deep Dive: Understanding the Lifetime Costs of Alternative Vehicles

Date: Wednesday, January 21, 2026

Time: 1:00 – 2:00 PM Central Time

Hosted by the **North Central Texas Council of Governments (NCTCOG)**

Register in Microsoft Forms at:
https://forms.microsoft.com/r/xUwXMneVGW

Webinar will be presented through **ZOOM**

Contact: Trey Pope, tpope@nctcog.org

Jason Brown, jbrown@nctcog.org

Presenters:

Juliana VandenBorn, NCTCOG

Cabell Hodge, National Laboratory of the Rockies

OVERVIEW

Image provided by Getty

Welcome, Introduction
Presenter: Trey Pope, Transportation/Air Quality Planner, NCTCOG

Estimating Total Cost of Ownership
Presenter: Juliana VandenBorn, Senior Air Quality Planner, NCTCOG

Alternative Fuel Vehicle and Infrastructure Costs, Tools, and Considerations
Presenter: Cabell Hodge, Vehicle and Infrastructure Analysis Group Manager, National Laboratory of the Rockies

Discussion

Updates and Close

Saving Money and Reducing Trucking Emissions Program

GOALS

Promote emissions reduction and cost saving strategies within the trucking industry

INITIATIVES

Build relationships within the trucking industry

Share information about emission reduction strategies

Connect SmartWay verified technology to trucking owner/operators and fleet managers

SMARTE

Saving Money and Reducing Truck Emissions

Estimating Total Cost of Ownership

Juliana VandenBorn, Senior Air Quality Planner
North Central Texas Council of Governments /
Dallas-Fort Worth Clean Cities

Who We Are

Regional Planning Agency

North Central Texas Council of Governments

Metropolitan Planning Organization (MPO)

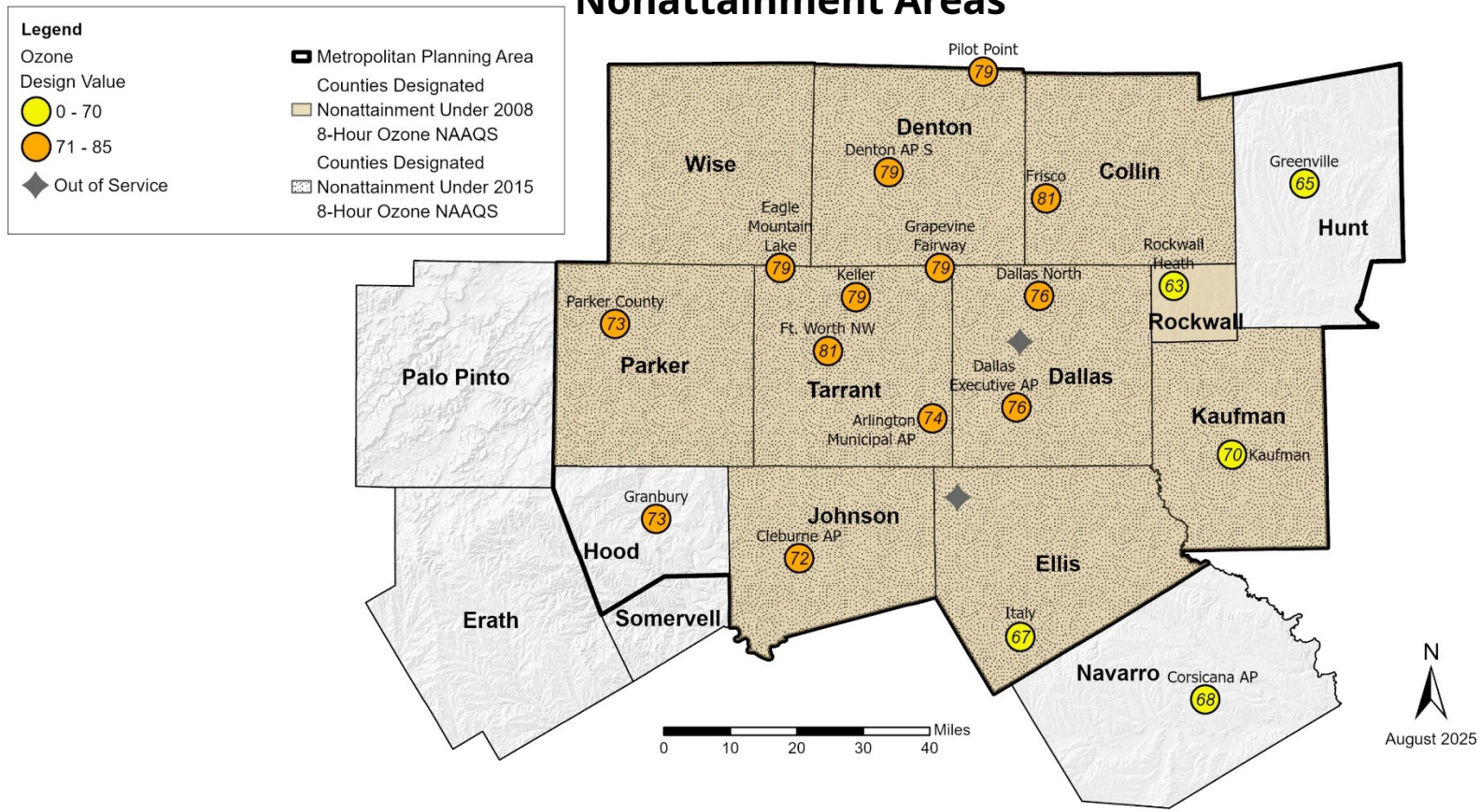
Regional Transportation Council

Department of Energy-Designated Clean Cities Coalition

Sister Coalitions in Texas:

Alamo Area Clean Cities (San Antonio)
Central Texas Clean Cities (Austin)
Houston-Galveston Clean Cities
Apprentice Coalition: South Texas Clean Cities (Rio Grande Region)

North Central Texas Council of Governments (NCTCOG) Region and Nonattainment Areas

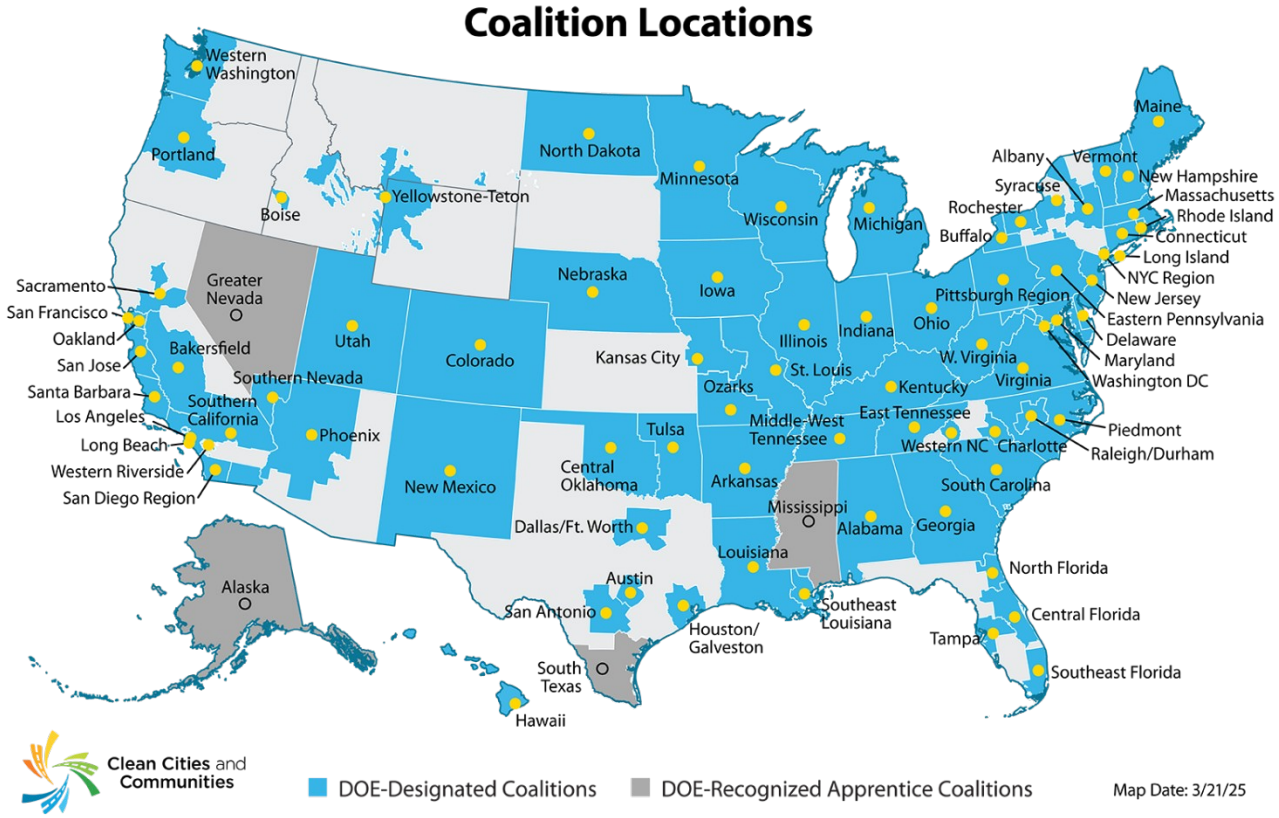


Source: NCTCOG

National Network of Clean Cities Coalitions

More than 85 Clean Cities coalitions with thousands of stakeholders, representing ~90% of U.S. population

Designated by the Department of Energy



Clean Cities Portfolio

- New Mobility Choices and Emerging Transportation Technologies

- Light-, Medium-, and Heavy-Duty Vehicles

- Idle Reduction Measures and Fuel Economy Improvements

- Alternative and Renewable Fuels and Infrastructure

Alternative Fuels and Energy Team

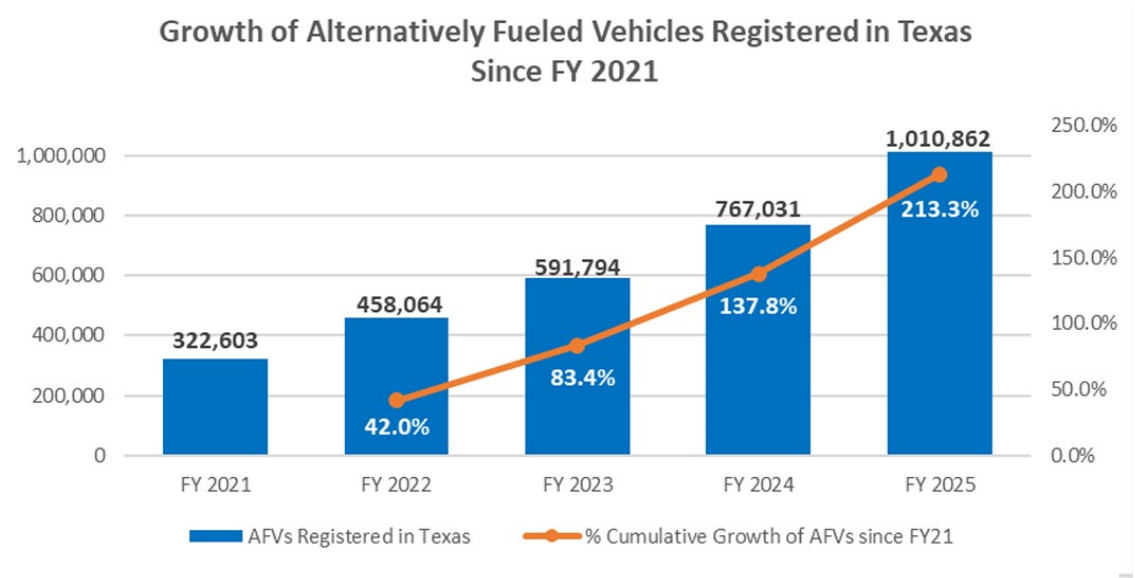
Key Focus Areas & Goals

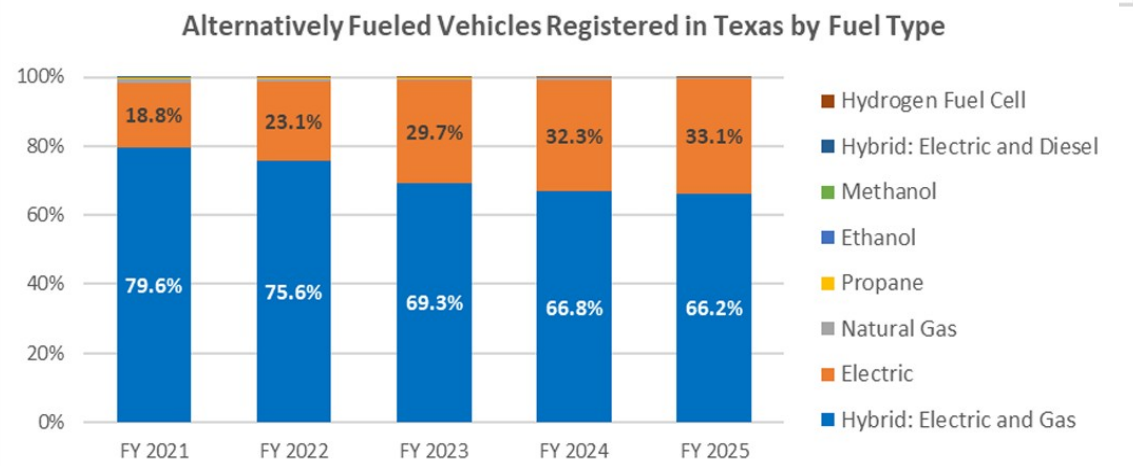
- Clean Vehicle Initiatives
- Alternative Fuel Infrastructure Initiatives
- Energy Integration & Community Readiness

What We Do

- Funding Support
- Technical Assistance
- Planning the Future
- Raising Awareness

Alternative Fuel Vehicle Adoption in Texas





Source: FY_2025_Alternatively_Fueled_Vehicle_Report.pdf

All-Electric Vehicles Represent the Largest Year over Year Growth of Any Alternative Fuel

All-Electric and Plug-In Hybrid Vehicle Registration as of December 30, 2025*

- Class 7 and 8: 229
- Class 2B -6: 27,098
- Class 1 – 2a: 453,991

Hydrogen Fuel Cell Vehicles are of Increasing Interest

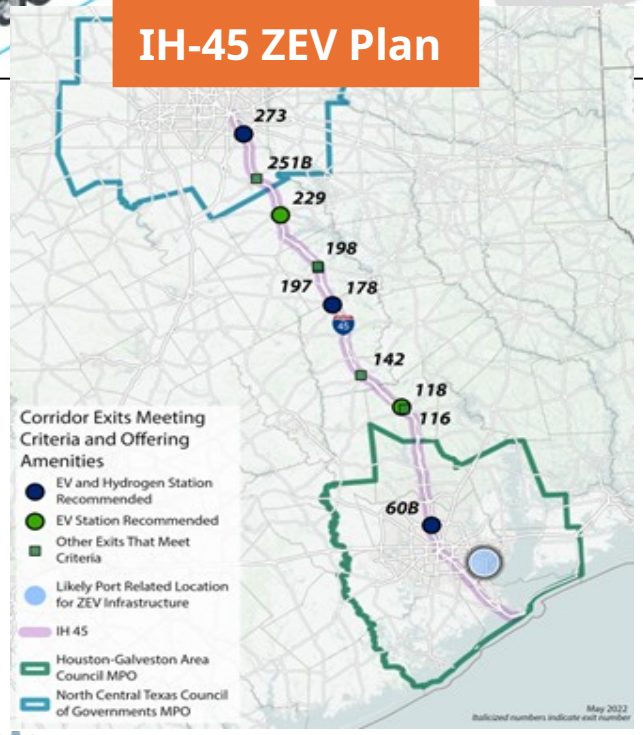
- 12 Hydrogen Fuel Cell Vehicles Registered as of 2025
- UT Austin Hydrogen Rideshare Demo
- State of Texas Created a Hydrogen Fuel Cell Grant Program
- Hydrogen Fuel Cell Class 8 Truck Demo as part of Run on Less

*https://dfwcleancities.org/registration-data-and-maps

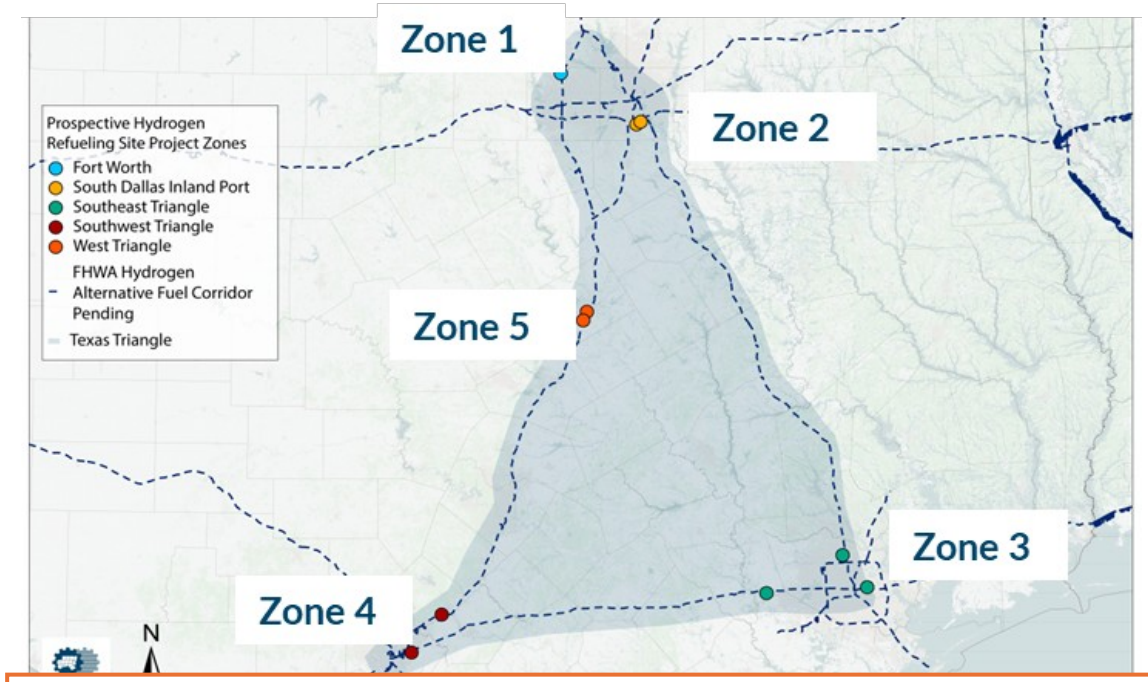
Developing ZEV Infrastructure in Texas

H2- LA

IH-45 ZEV Plan



Texas Hydrogen and Electric Freight Infrastructure Project (Tx-HEFTI): $70 Million Award



Other Texas ZEV Investments

Gulf Coast Hydrogen Hub: $1.2B to GTI Energy for Clean Hydrogen Hub

Gage Zero and Hillwood Builds EV Fleet Charging Hub at AllianceTexas

Texas EV Charging Plan: $400M for TX; Can include Freight Charging for Phase II

EPA Clean Ports: $105M to Port of Corpus Christi

Total Cost of Ownership (TCO)

What is TCO and what is it used for?

- Total Annual Costs of a *New Vehicle Purchase* Over a Set Span of Years (Planner Ownership)
- Estimate TCO of Alternative Fuel Vehicles (AFV) Compared to Conventional Vehicles

Identifying Available Tools/Resources

- Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool www.afleet.esia.anl.gov/home/
- Fueleconomy.gov - www.fueleconomy.gov
  - Find a Car, Plug-in Hybrid Cost Savings Calculator, Fuel Savings Calculator
- Alternative Fuel Data Center (AFDC) - www.afdc.energy.gov/
  - Vehicle Search, Vehicle Cost Calculator, VICE Model
- CALSTART Zero-Emission Vehicle Inventory - www.globaldrivetozero.org/tools/zeti/
- Atlas EV Hub Dashboard for Rapid Vehicle Electrification (DRVE) Tool www.atlaspolicy.com/dashboard-for-rapid-vehicle-electrification-drve/
- NACFE Run on Less - www.nacfe.org/research/run-on-less/run-on-less/
- Environmental Defense Fund Fleet Electrification Solutions Center - www.electricfleet.org/

Total Cost of Ownership (TCO) Inputs
Vehicle Type: Long Haul Freight Truck

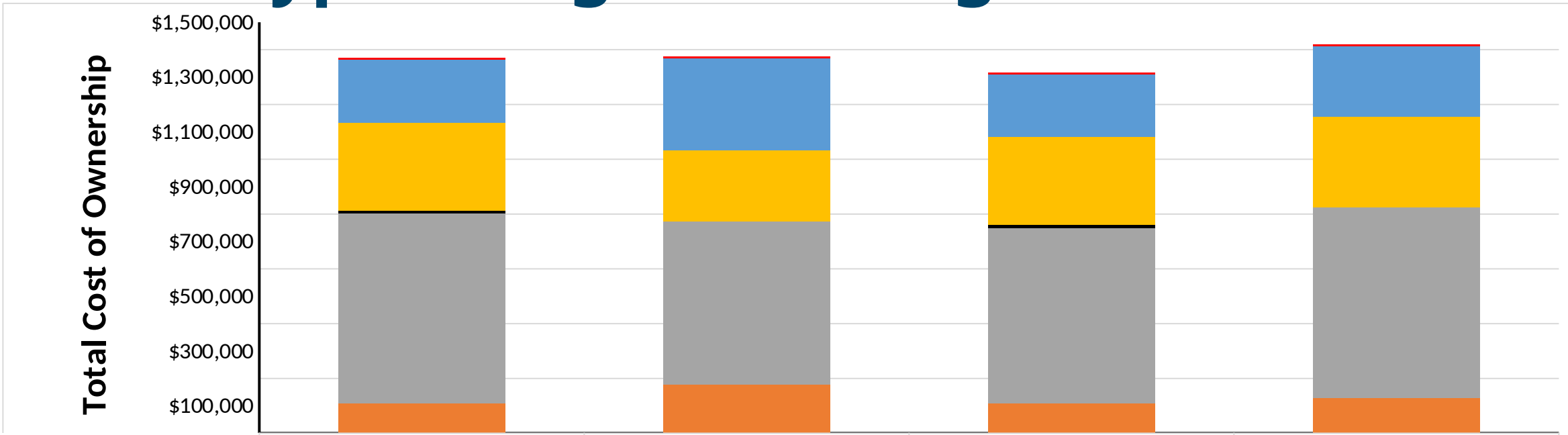
Vehicle Type	Fuel Type	Cost	Incentive	Maintenance and Repair	Fuel Economy (MPDG)	Fuel Price	Annual Mileage	Years of Ownership
Mack Pinnacle	Diesel	$185,000	N/A	$0.22	7.2	$3.34	170,000	8
Freightliner Cascadia	CNG	$250,000	$16,355 (TERP TNGVGP)	$0.23	6.5	$2.80	170,000	8
Hino XL7	Biodiesel	$185,000	N/A	$0.22	7.2	$4.52	170,000	8
Peterbilt 579EV	Electric	$428,000	$72,182 (TxVEMP All-Electric)	$0.19	12.7	$0.14	170,000	8

Note:

- **Vehicle Type Makes and Models only used as examples, vehicle specifications NOT specific to Make/Model**
- **AFLEET Defaults used for ALL inputs**

*Source: www.afleet.esia.anl.gov/home/

Total Cost of Ownership (TCO) Results*
Vehicle Type: Long Haul Freight Truck



	Diesel	EV	B20	CNG
Depreciation	$107,952	$177,566	$107,952	$129,526
Fuel	$693,422	$597,107	$641,421	$694,568
Diesel Exhaust Fluid	$11,907	$0	$11,907	$0
Maintenance and Repair	$319,547	$257,936	$319,547	$330,676
Insurance	$229,924	$336,053	$229,924	$258,313
License and Registration	$6,331	$6,331	$6,331	$6,331

$72k & $16k Incentives Applied to EV& CNG

*Source:
www.afleet.esia.anl.gov/home/

NCTCOG North Texas Zero Emissions Vehicles Call for Projects

$58.6M to replace existing ICE heavy-duty vehicles with zero-emission vehicles,

- **Class 6 or Class 7 "Vocational" Vehicles ONLY (GVWR between 19,501 lbs to 33,000 lbs)**
- **Can include funding for infrastructure**

Sales

Open Now through February 13, 2026 – Apply Now at www.nctcog.org/NTxZEV

Vehicle Type	Battery Electric Vehicles Maximum Funding
Straight/Box Truck	65%, up to $190,000
Step Van	65%, up to $160,000
Septic/Bucket Truck	65%, up to $330,000
Other Vocation	65%, up to $355,000
Refuse Hauler	50%, up to $260,000
Street Sweeper	50%, up to $315,000
Transit Bus	33%, up to $265,000

Vehicle Type	Hydrogen Fuel Cell Electric Vehicles Maximum Funding
Straight/Box Truck	80%, up to $400,000
Step Van	80%, up to $340,000
Septic/Bucket Truck	80%, up to $670,000
Other Vocation	80%, up to $720,000
Refuse Hauler	70%, up to $600,000
Street Sweeper	70%, up to $720,000
Transit Bus	60%, up to $780,000

Texas Emissions Reduction Plan (TERP) Funding

o to www.tceq.texas.gov/airquality/terp/programs for a full list of programs

Light-Duty Motor Vehicle Purchase or Lease Incentive Program **- Open Now through March 6, 2026** Provides up to $5,000 for the purchase or lease	Emissions Reduction Incentive Grants (ERIG)
Alternative Fueling Facilities Program (AFFP)	**Texas Clean School Bus Program (TCSB) – Open Now through May 22, 2026** Provides up to 80% of the incremental cost of the vehicle for newer, cleaner versions school buses
Seaport and Rail Yard Areas Emissions Reduction Program	New Technology Implementation Grant (NTIG)
Texas Natural Gas Vehicle Grant Program (TNGVGP)	Governmental Alternative Fuel Fleet Grant Program (GAFF)
Texas Clean Fleet Program (TCFP)	Rebate Grants

Texas Volkswagen Environmental Mitigation Program – All-Electric Grant Round

~$30M available: tceq.texas.gov/agency/trust/all-electric

Purchase New Battery or Fuel Cell Electric Vehicle/Equipment to Replace or Repower Existing Diesel	Funding Threshold
Class 4-8 Local Freight or Port Drayage Trucks GVWR 14,001 Pounds and Up Used to Transport Freight, Cargo, or Refuse Model Year 1992-2009	Open Now through August 31, 2026 For Government Entities: Up to 100% of Incremental Cost For Non-Government Entities: Up to 75% of Incremental Cost "Incremental Cost" = the eligible cost of the project less default scrap value* and any other financial incentives, tax credits, etc.
Class 4-8 School, Shuttle, or Transit Buses GVWR 14,001 Pounds and Up Used to Transport Passengers within a City or Defined Region Model Year 2009 or Older	
Airport Ground Support Equipment Tier 0, Tier 1, or Tier 2 Diesel Equipment 25 HP and Up Used to Service Aircraft Between Flights	
Forklifts and Port Cargo Handling Equipment Tier 0, Tier 1, or Tier 2 Diesel Engines Must have Greater than 9,000 Pounds Lift Capacity	

Additional Funding Opportunities

Research more funding here:
www.nctcog.org/aqfunding

Program/Incentive	Eligible Activities	Funding Amount	Key Dates
North Texas Diesel Emissions Reduction Project	Replace on-road diesel vehicles with a GVWR of over 16,001 or non-road diesel equipment and drayage with GVWR of over 33,001 lbs Replace diesel transport refrigeration unit with all-electric Install EPA verified idle reduction	Up to 45% for zero-emission vehicle Up to 35% for CARB Low NO_X Vehicle Up to 25% for all other fuels	NCTCOG Call for Projects Open Now through March 13, 2026
Alternative Fuel Vehicle Refueling Property Credit	Installation of qualified fueling equipment, such as EV charging infrastructure in eligible locations **Available to tax-exempt entities through the new DIRECT PAY option**	Up to 30% tax credit	Open Now through June 30, 2026

Considerations for Vehicle Funding

- Can a vehicle be scrapped?
  - Sales
- Fuel type of new vehicle?
- Is infrastructure funding needed?
- Will other funding be used for the same vehicle?
- When will the new vehicle be purchased?

Other Strategies To Reduce Emissions and Save Money

Strategy	Saves Money	Reduces Emissions	Extends Engine Life	Less Noise
Idle Reduction	X	X	X	X
Driver Training	X	X	X	
Route Optimization	X	X		
Rightsizing	X	X		X
Downsizing	X	X		
Drop-in Fuels	X*	X		X*

*Benefits will vary depending on alternative fuel type

Get Involved with DFWCC

Contact us at cleancities@nctcog.org for any questions on fleet electrification, funding opportunities, or other inquiries

Upcoming webinars and events posted regularly at dfwcleancities.org/events

Sign up for DFWCC weekly email list and follow DFWCC LinkedIn at: dfwcleancities.org/get-involved

Contact Us

Juliana VandenBborn
Senior Air Quality Planner
jvandenborn@nctcog.org

Jared Wright
Infrastructure
Senior Air Quality Planner
jwright@nctcog.org

Savana Nance
Vehicles and Energy
Principal Air Quality Planner
snance@nctcog.org

Lori Clark
DFWCC Director
Senior Program Manager
lclark@nctcog.org

---

dfwcleancities.org

cleancities@nctcog.org

@NCTCOGTrans

linkedin.com/showcase/dfwcleancities/

NATIONAL LABORATORY OF THE ROCKIES

Alternative Fuel Vehicle and Infrastructure Costs, Tools, and Considerations

Cabell Hodge, NLR

North Central Texas Council of Governments Webinar

January 21, 2026

Photo by Josh Bauer, National Laboratory of the Rockies 61725

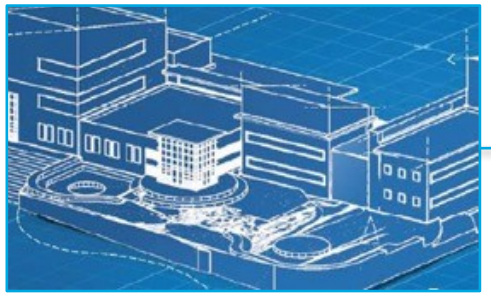
Contents

National Laboratory of the Rockies

Foundational Science | **Accelerated Technology Scale-Up** | **Market/Systems Analysis** | **Commercialization**

Bench-scale- discovery | Scaling R&D and Process Engineering | R&D with Industry Partners

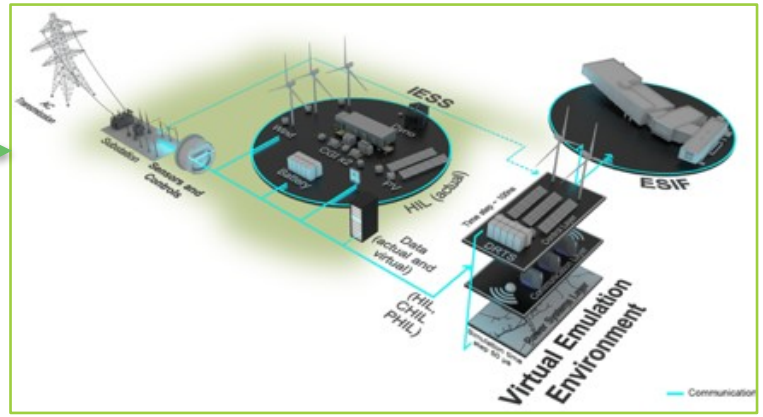
Solar Energy Research Facility
Science and Technology Facility
Field Test Laboratory Building



Energy Materials and Processing at Scale (Completion 2027)

Energy Systems Integration Facility (ESIF)

- Transportation fuels
- Grid & security tech
- Products from electrochemical processes
- Advanced batteries
- Electricity generation and grid integration
- New buildings and industrial materials, manufacturing and systems

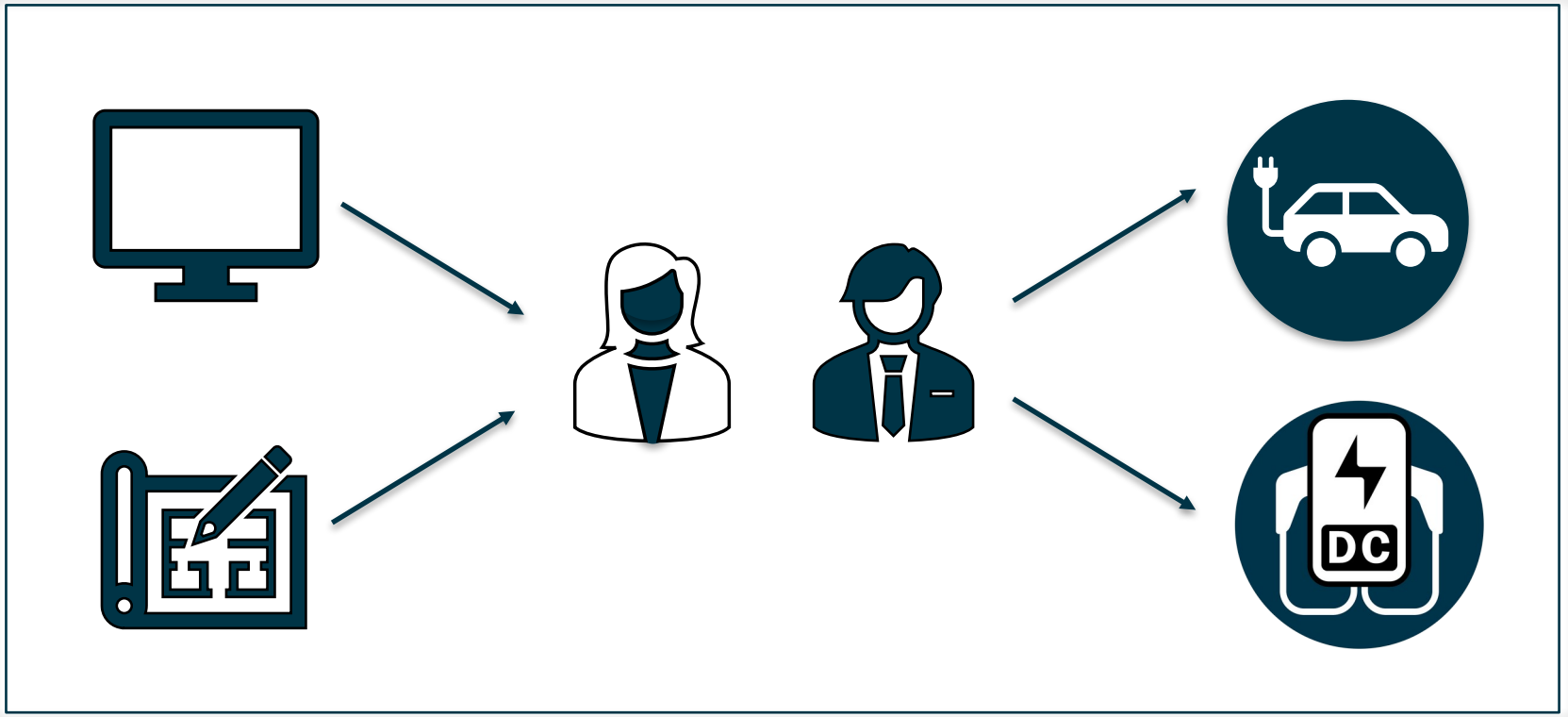


Advanced Research on Integrated Energy Systems (ARIES)

High-Performance Computing, Simulation, and Visualization

NLR Vehicle and Infrastructure Analysis

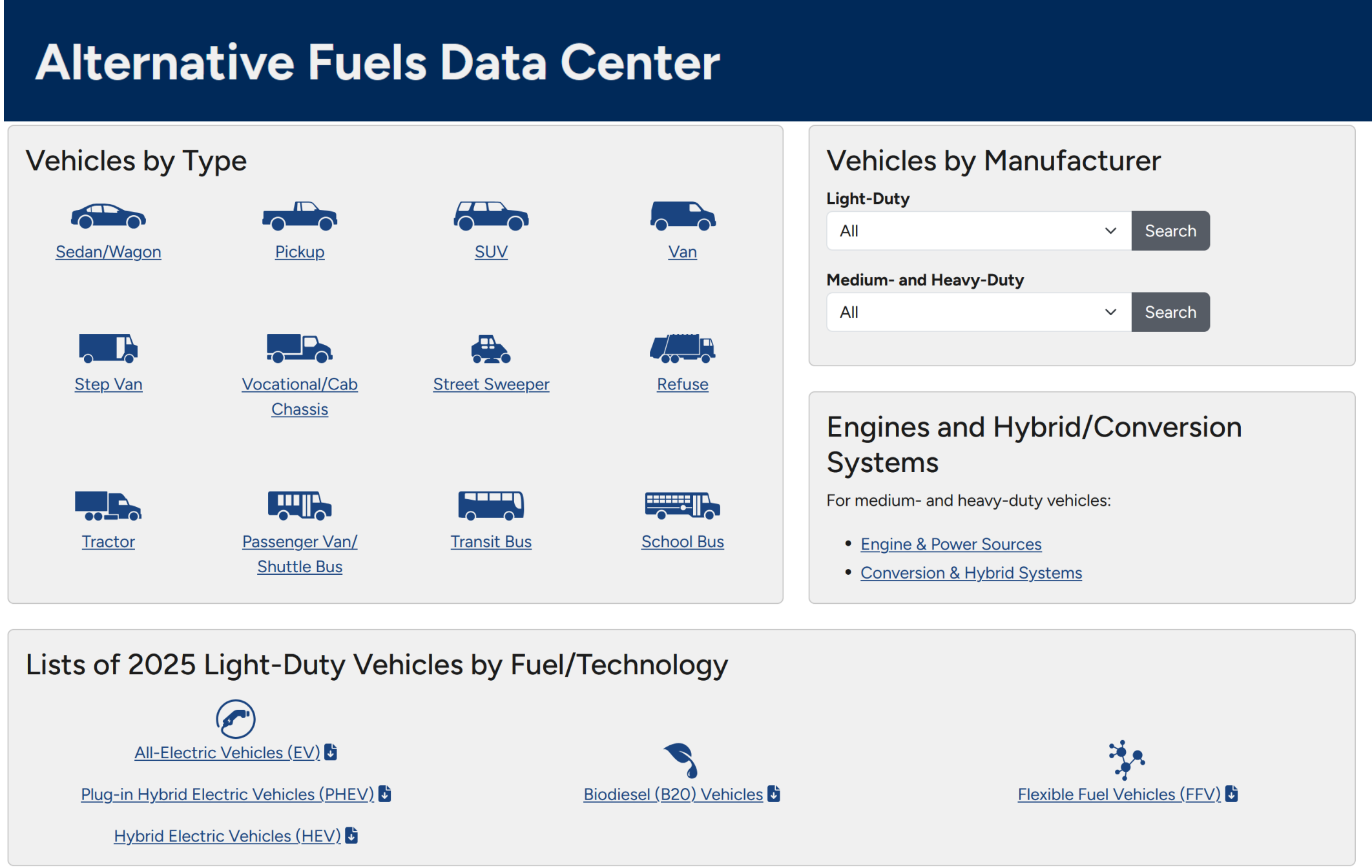
Tools, expert support, and analytical frameworks to support decisionmakers with the deployment of advanced vehicles and infrastructure



Publicly Available Tools

For vehicle and infrastructure costs

AFDC Vehicle Search Tool



https://afdc.energy.gov/vehicles/search

AFDC Vehicle Search Tool Results

Heil Environmental Rear Loader: PT1100, DuraPack 5000, DuraPack 4060 Split Body, PT1000

CNG - Compressed Natural Gas

Power Source(s):
Cummins L9N 8.9L Near Zero

Heil Environmental Side Loader: RevAMP fully electric

Electric

Note: Body can be run with its own independent battery or integrated to operate from chassis battery. Can be mounted on all industry leading OEM electric, diesel, or CNG chassis.

Model Year +

Fuel/Technology +

Class/Type −

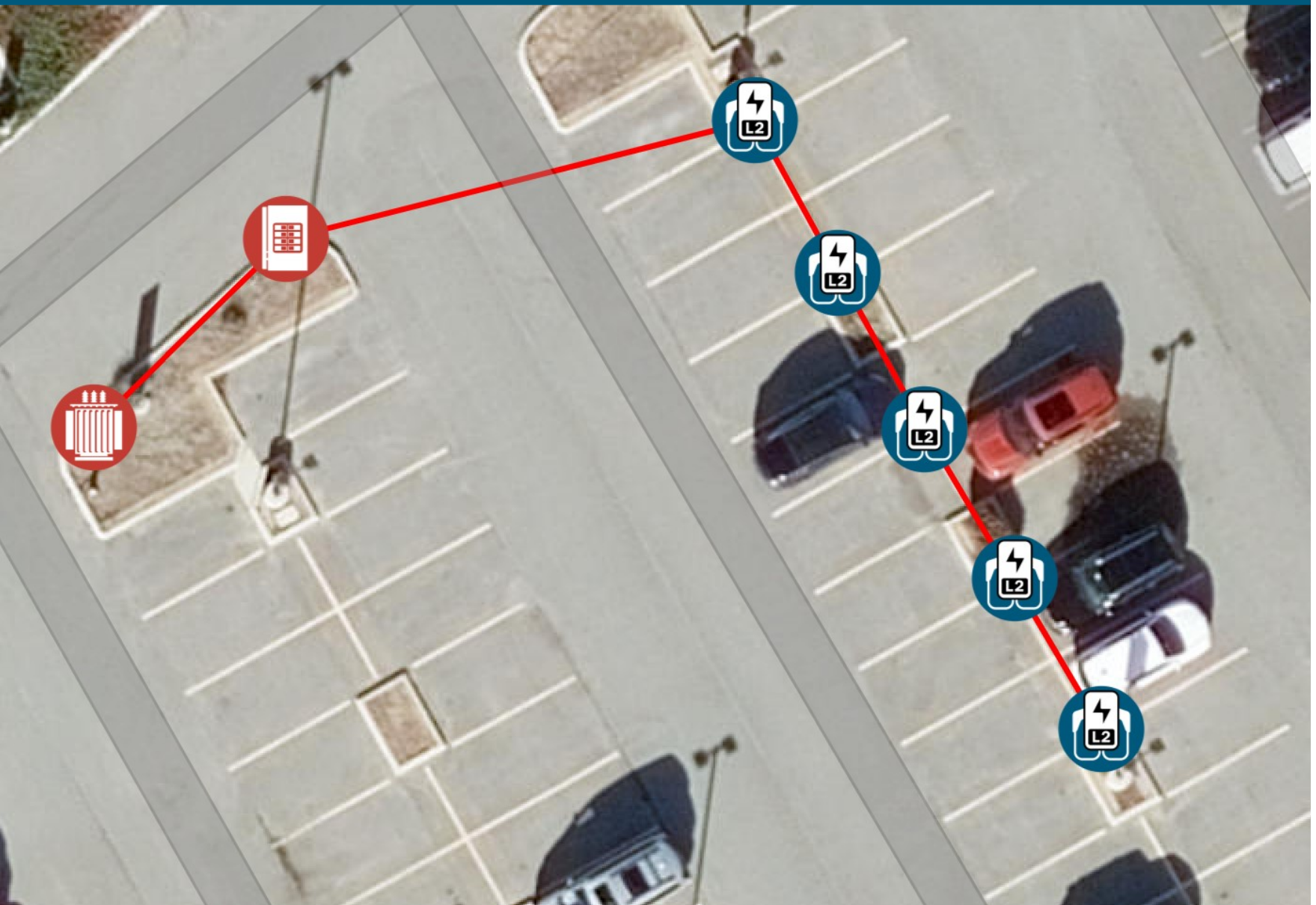
- [ ] All Classes/Types
- [ ] Sedan/Wagon
- [ ] Pickup
- [ ] SUV
- [ ] Van
- [ ] Step Van
- [ ] Vocational/Cab Chassis
- [ ] Street Sweeper
- [x] Refuse
- [ ] Tractor
- [ ] Passenger Van/Shuttle Bus
- [ ] Transit Bus
- [ ] School Bus

Manufacturer - Light-Duty +

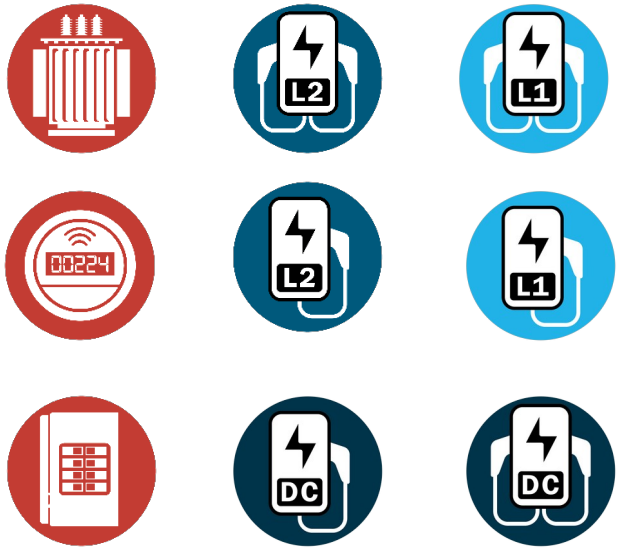
Manufacturer - Med & Heavy-Duty +

https://afdc.energy.gov/vehicles/search

EVI-LOCATE



Users walk through prompts and decide where they would like to install equipment

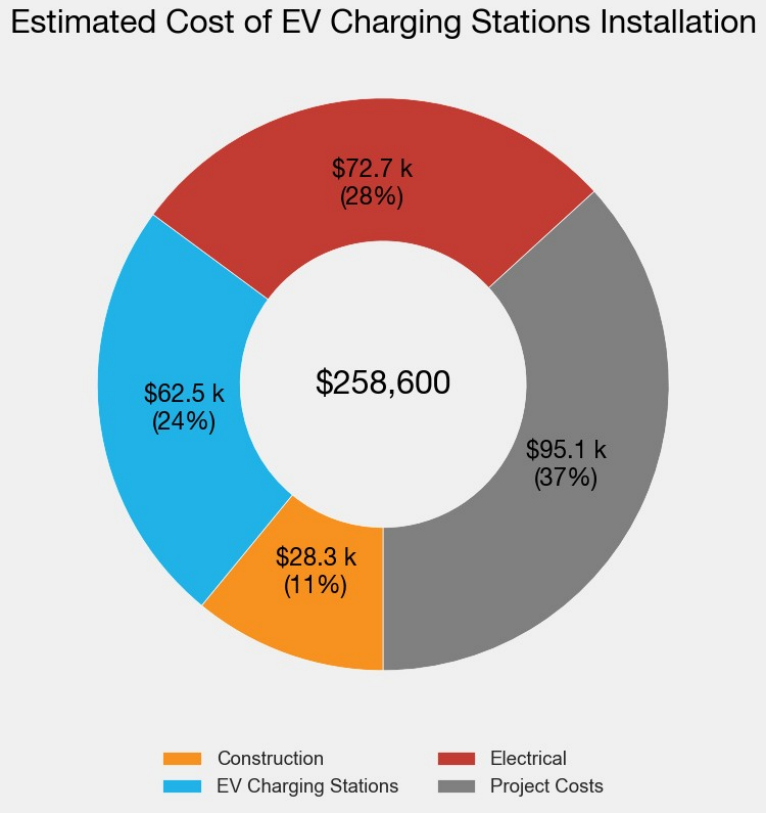


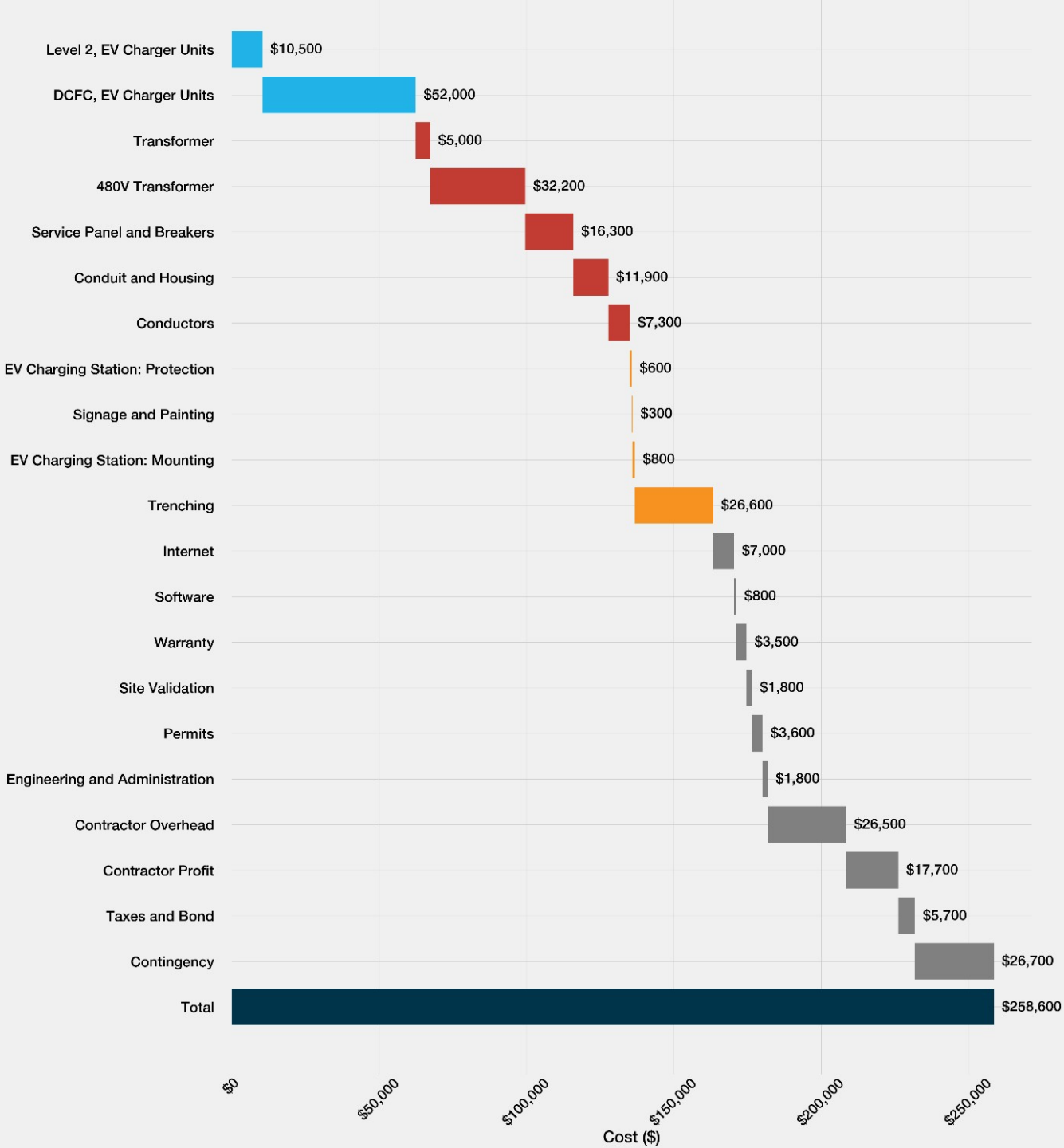
https://evi-locate.nrel.gov/

EVI-LOCATE

Detailed cost estimates for EV charging infrastructure by specific location

https://evi-locate.nrel.gov





AFDC Vehicle Cost Calculator

Choose vehicles to compare

Select up to eight vehicles to compare from the makes and models below or create your own custom vehicle.

2024 | Ford | F150 Pickup 4WD HEV 6cyl 3.5L Automatic (S10) Hybrid | Add >>

Create Custom Vehicle

Vehicle	Price	Fuel Economy (City/Hwy)	Fuel Type
 2024 Ford F-150 Lightning 4WD Automatic (A1) EV $39,974.00 - $90,874.00	$ 39,974 Tax credit?	44/49 kWh/100mi	Electric
 2024 Ford F150 Pickup 4WD 8cyl 5.0L Automatic (S10) Gasoline $41,980.00 - $74,150.00	$ 41,980	16/24 mpg	Gasoline
 2024 Ford F150 Pickup 4WD HEV 6cyl 3.5L Automatic (S10) Hybrid $33,935.00 - $74,600.00	$ 33,935 Tax credit?	22/24 mpg	Hybrid

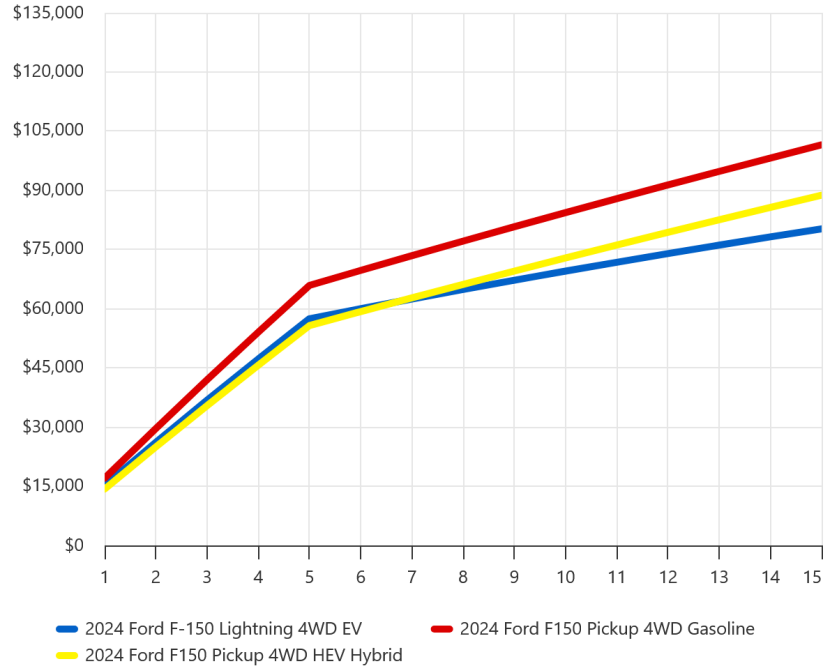
Normal Daily Use

Average daily driving distance	34 miles
Days per week	5
Weeks per year	49
Percent highway	45

https://afdc.energy.gov/calc/

Annual Driving Distance	**11926 miles**
City Distance	**5301 miles**
Highway Distance	**6625 miles**

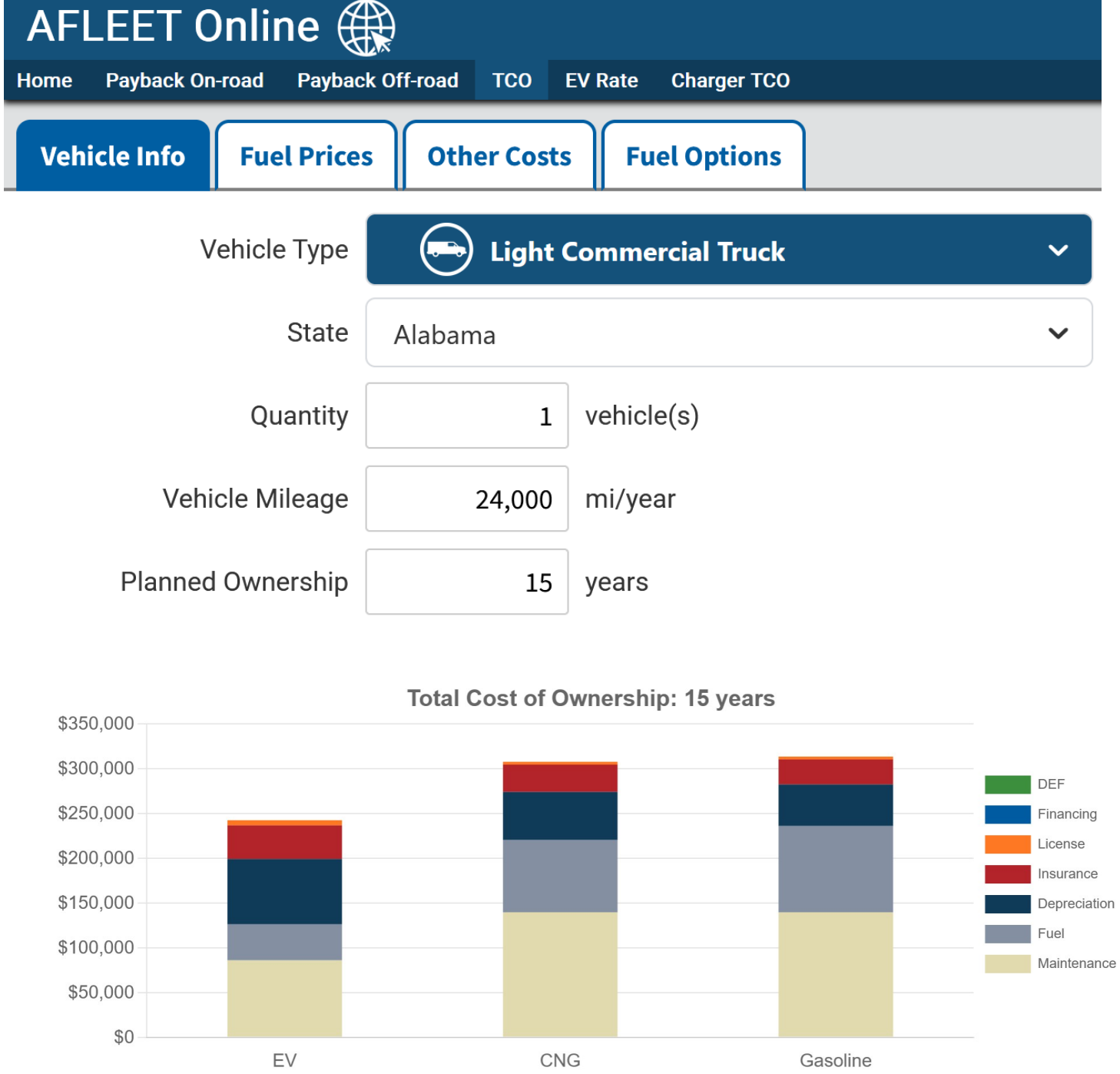
Cumulative Cost of Ownership by Year (Dollars)



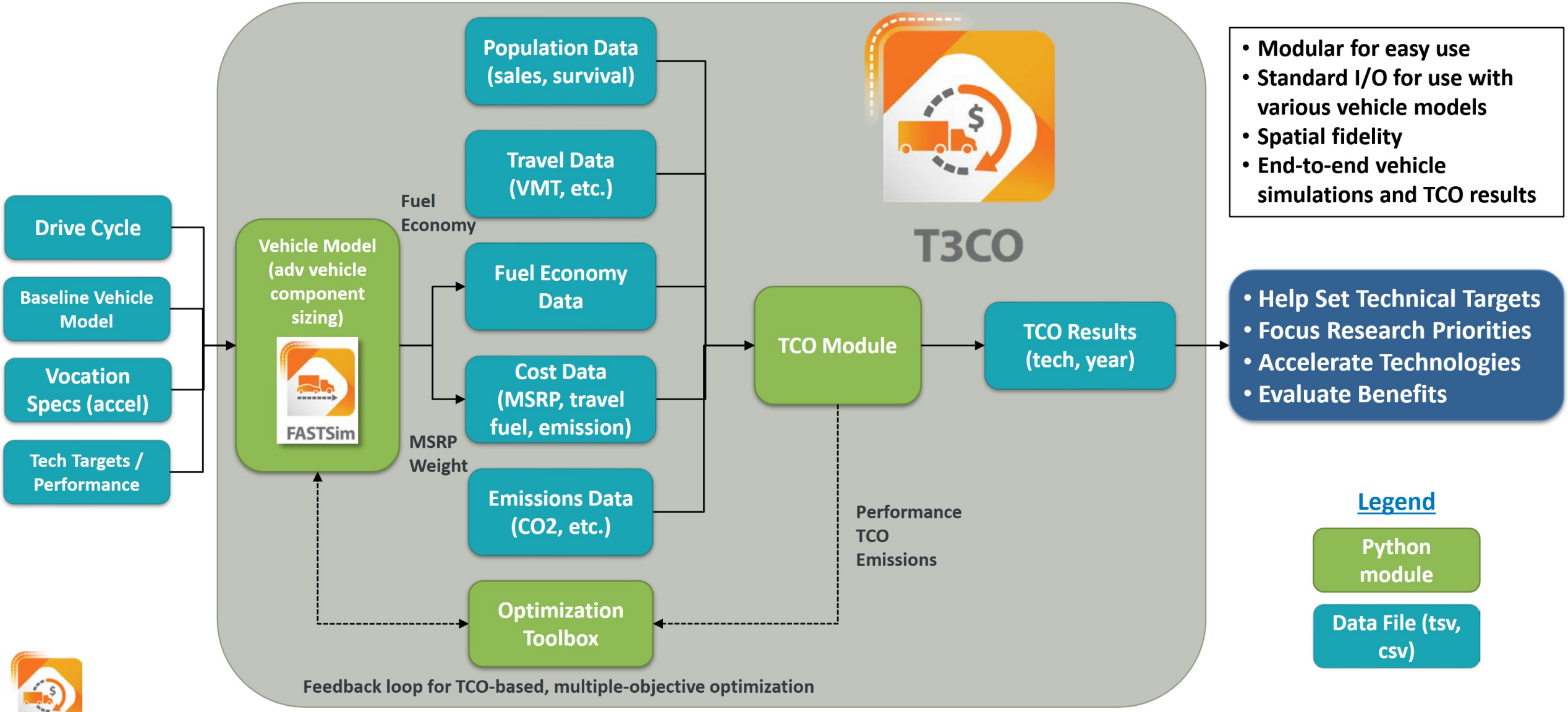
AFLEET

Web-based or Excel calculator tool for vehicle total cost of ownership

https://afleet.esia.anl.gov/afleet/



Transportation Technology Total Cost of Ownership (T3CO)



T3CO https://www.nrel.gov/transportation/t3co.html

ZPAC Detailed Fleet Analysis for EVs

Fleets managers can use the tool to make decisions individually across an entire fleet of vehicles, accounting for BEV range concerns, fuel consumption, and costs

BEV Considerations					Decision Point	
BEV SIN Availability	Modeled BEV Range Concerns*	Reported BEV Range Concerns (Dropdown)	BEV Fuel Reduction Potential	Quality of BEV Candidate	ZEV Preference	Plan Year of Acquisition
2 - Similar BEV	3 - Unknown		1 - Very High	2 - Good	BEV	2024
2 - Similar BEV	2 - Some Public Charging		1 - Very High	2 - Good	BEV	2025
	Minima			2 - Good	PI	
	Minima Likely			2 - Good	B	
2 - Similar BEV	4 - Frequent Public Charging Likely		1 - Very High	3 - Mediocre	BEV	2030
2 - Similar BEV	5 - Very Frequent Public Charging Likely		1 - Very High	4 - Challenging	Eliminate	2025

ZEV replacement available?

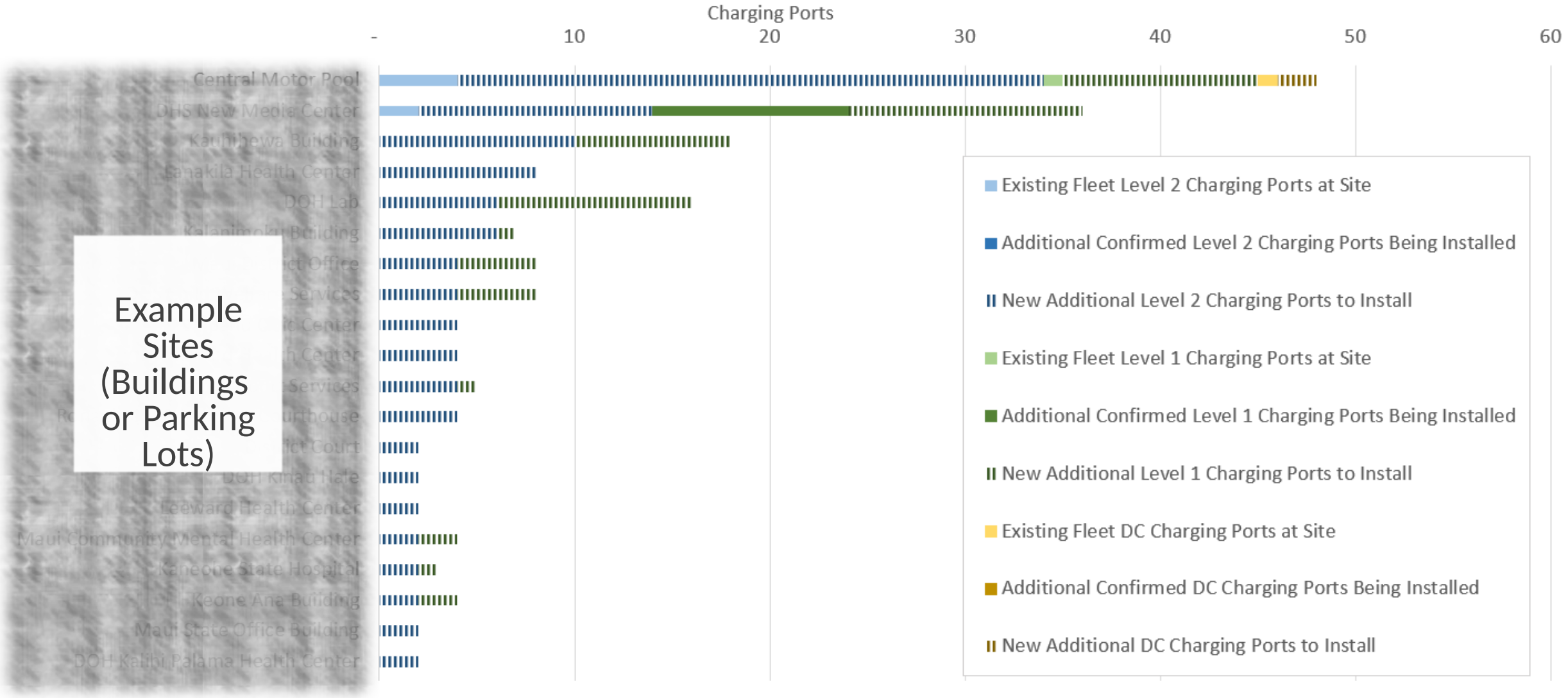
Nightly charging sufficient? Limit mission disruption

Fuel and costs benefits?

User Identifies Targets

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

ZPAC Fleet Charging Infrastructure Plans



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

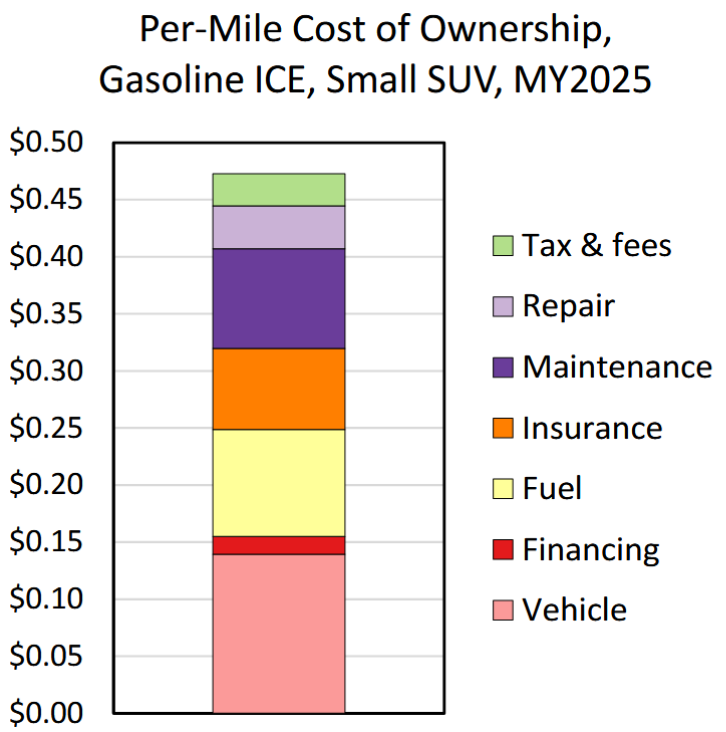
Resources for Deeper Dives on Vehicle and Infrastructure Costs

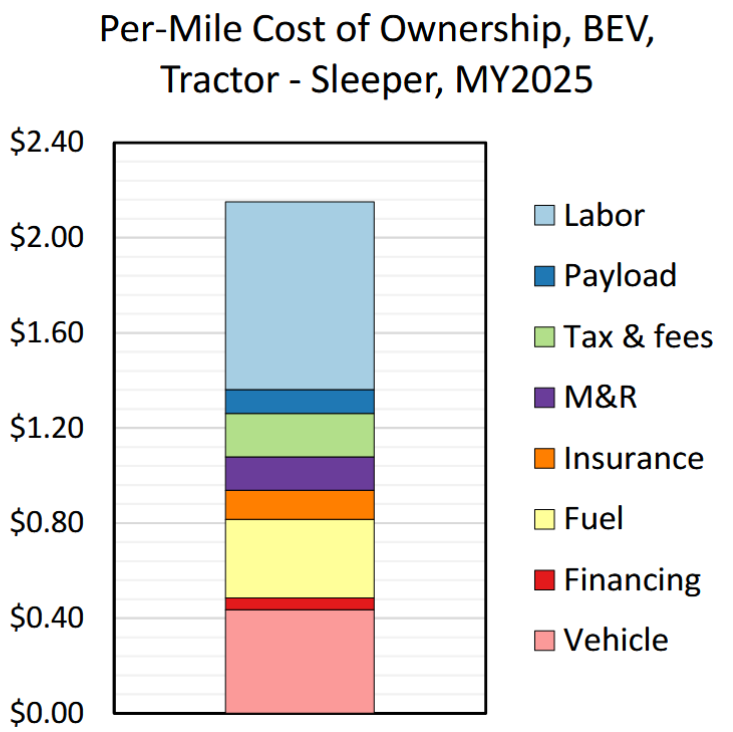
For vehicle and infrastructure costs

Vehicle Total Cost of Ownership Report

Andy Burnham et al. (2021)

Example content →





Cost Components
Purchase & Depreciation
Financing
Fuel
Insurance
Maintenance & Repair
Taxes & Fees

Size Classes
Compact Sedan
Midsize Sedan
Small Sport Utility Vehicle
Large Sport Utility Vehicle
Pickup Truck

Powertrains
Internal Combustion Engine
Hybrid Electric Vehicle
Plug-in Hybrid Electric Vehicle
Fuel Cell Electric Vehicle
Battery Electric Vehicle

Years
2020
2025
2030
2035
2050

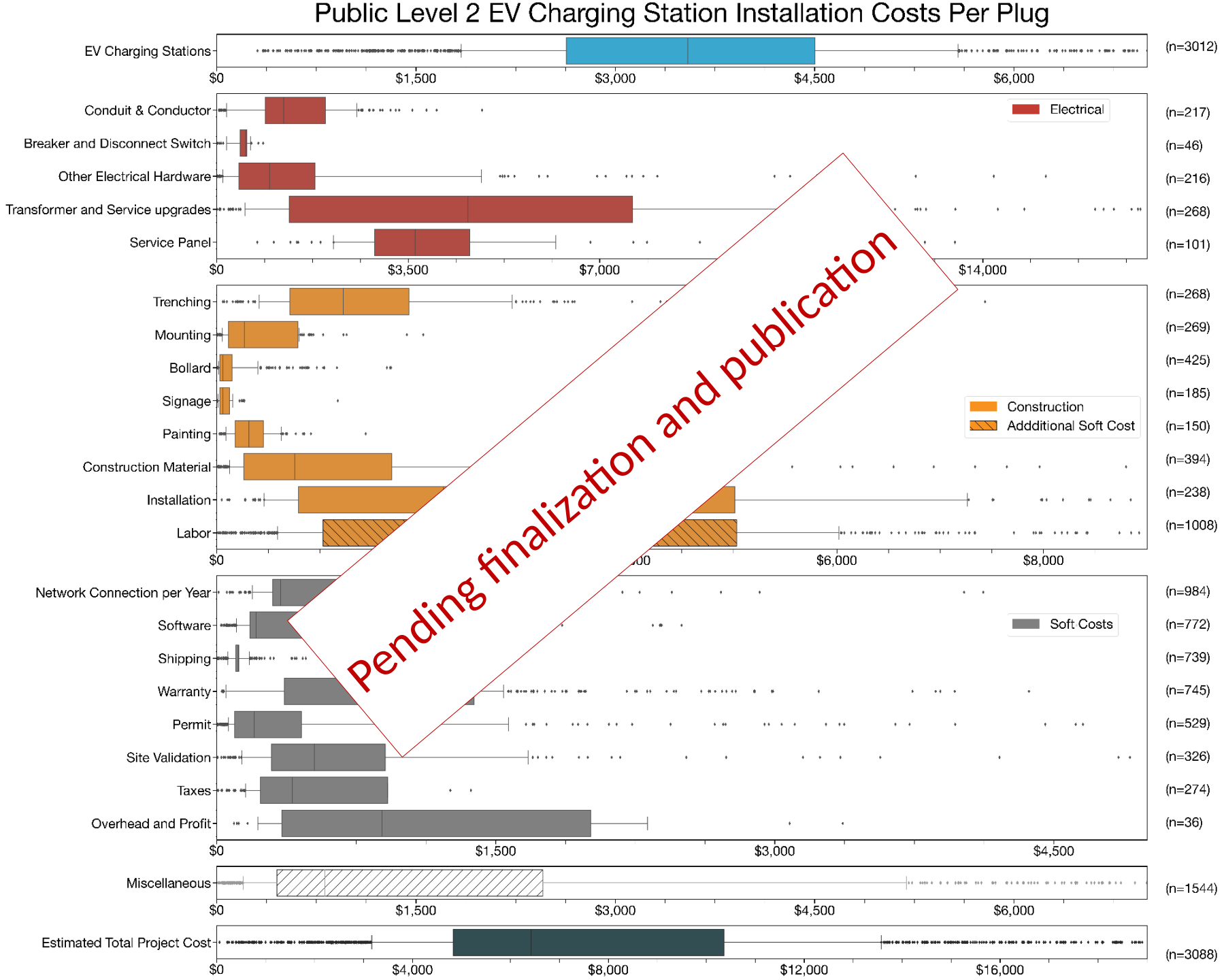
https://publications.anl.gov/anlpubs/2021/05/167399.pdf

EVSE Cost Analysis

Ranjit Desai et al. (2026)

Pending publication

https://www.nrel.gov/transportation/electric-vehicle-charging-soft-costs-analysis



CNG Station Cost Report

Margaret Smith and John Gonzales (2014)

2026 update in development

- Costs for small, medium, and large time-fill and fast-fill CNG stations
- Example content →

https://afdc.energy.gov/files/u/publication/cng_infrastructure_costs.pdf

Equipment	Cost Range
Compressor	$4,000–$550,000
• 1–8 scfm (1–4 gge/hr)	$4,000–$22,000
• 20–40 scfm (10–19 gge/hr)	$50,000–$90,000
• 50–75 scfm (24–36 gge/hr)	$80,000–$150,000
• 100–150 scfm (48–71 gge/hr)	$100,000–$250,000
• 250–650 scfm (119–310 gge/hr)	$200,000–$550,000
Dispenser	$25,000–$60,000
Dual-hose time-fill post	$4,000–$7,000
Storage tank	$70,000–$130,000
Card reader/fuel management system	$10,000–$30,000
Gas dryer	$10,000–$300,000

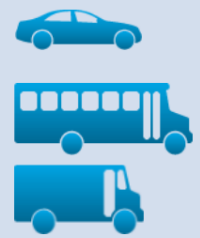
Propane Station Cost Report

Margaret Smith and John Gonzales (2014)

2026 update in development

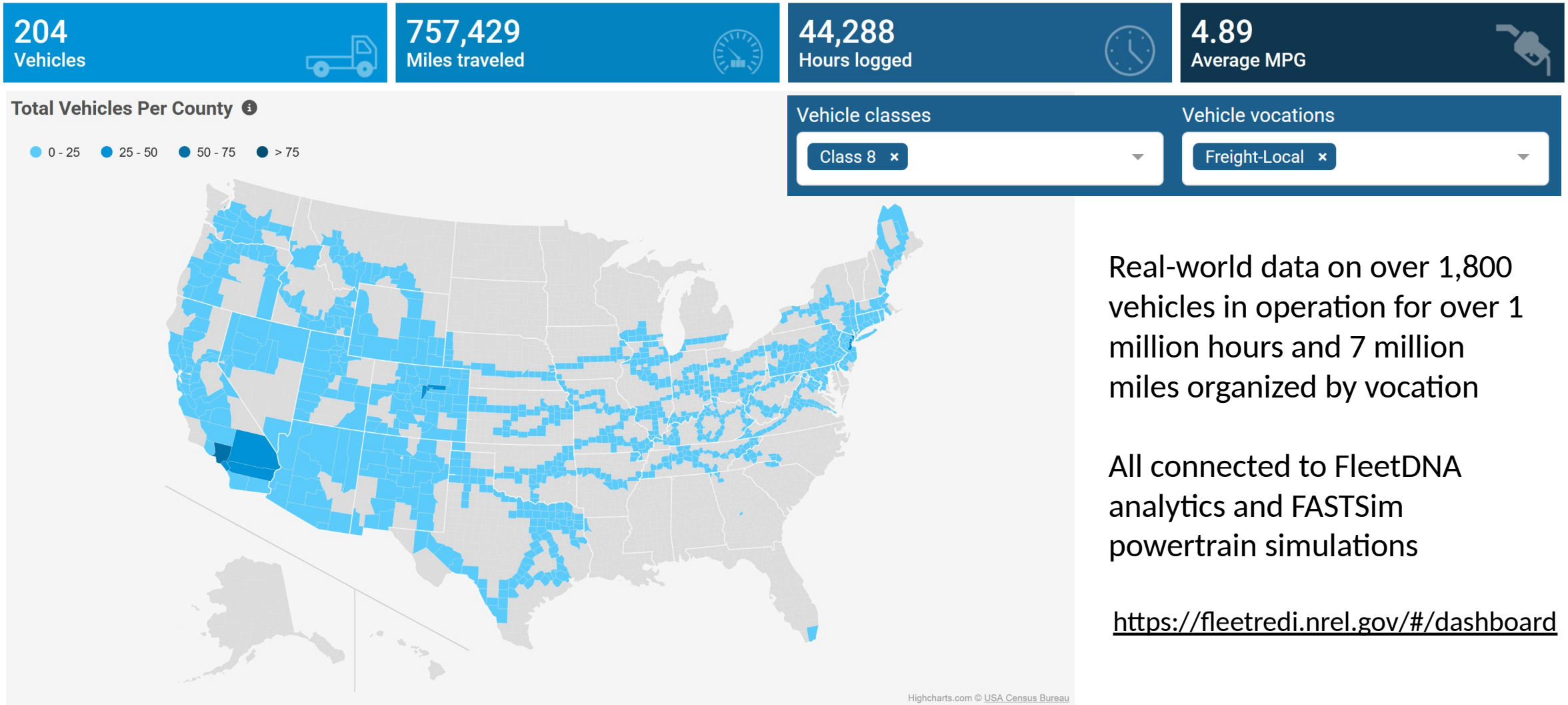
- Costs for small, medium, and large propanestations
- Example content →

Medium Stations

Station Design	Approx. Daily Fuel Use*	Cost Range	Example Applications*
12,000-gal storage tank 2 dual-hose dispensers	450–1,800 gal (If tank is filled with 1–3 transport loads/mo)	Purchasing New Equipment: $120,000–$145,000 *Initial Cost for Leasing: $15,000–$50,000*	35 school buses × 14 gal/day, 65 police cruisers × 7 gal/day, or 100 shuttle vans × 20 gal/day 
18,000-gal storage tank 3 dual-hose dispensers	900–2,400 gal (If tank is filled with 2–4 transport loads/mo)	Purchasing New Equipment: $150,000–$220,000 *Initial Cost for Leasing: $15,000–$50,000*	60 school buses × 16 gal/day, 70 shuttle vans × 20 gal/day, 100 school buses × 10 gal/day, or 150 taxis × 10 gal/day 

https://afdc.energy.gov/files/u/publication/propane_costs.pdf

FleetREDI



Real-world data on over 1,800 vehicles in operation for over 1 million hours and 7 million miles organized by vocation

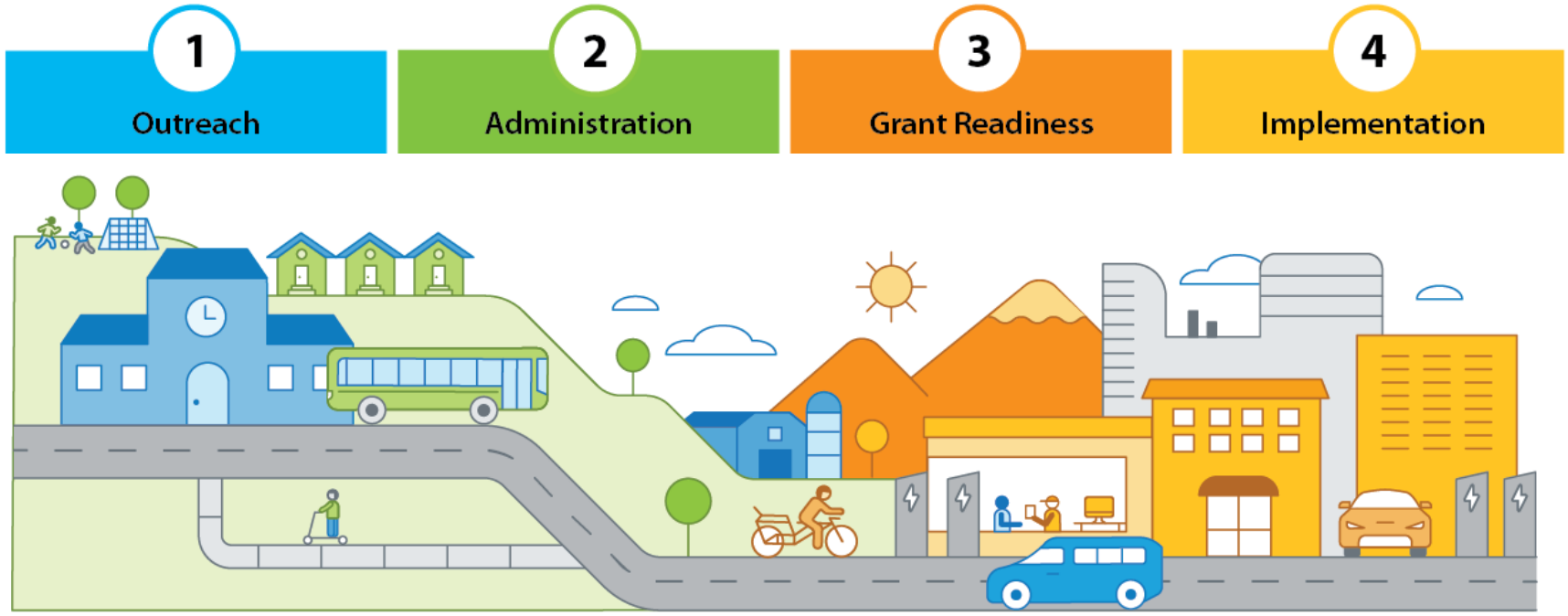
All connected to FleetDNA analytics and FASTSim powertrain simulations

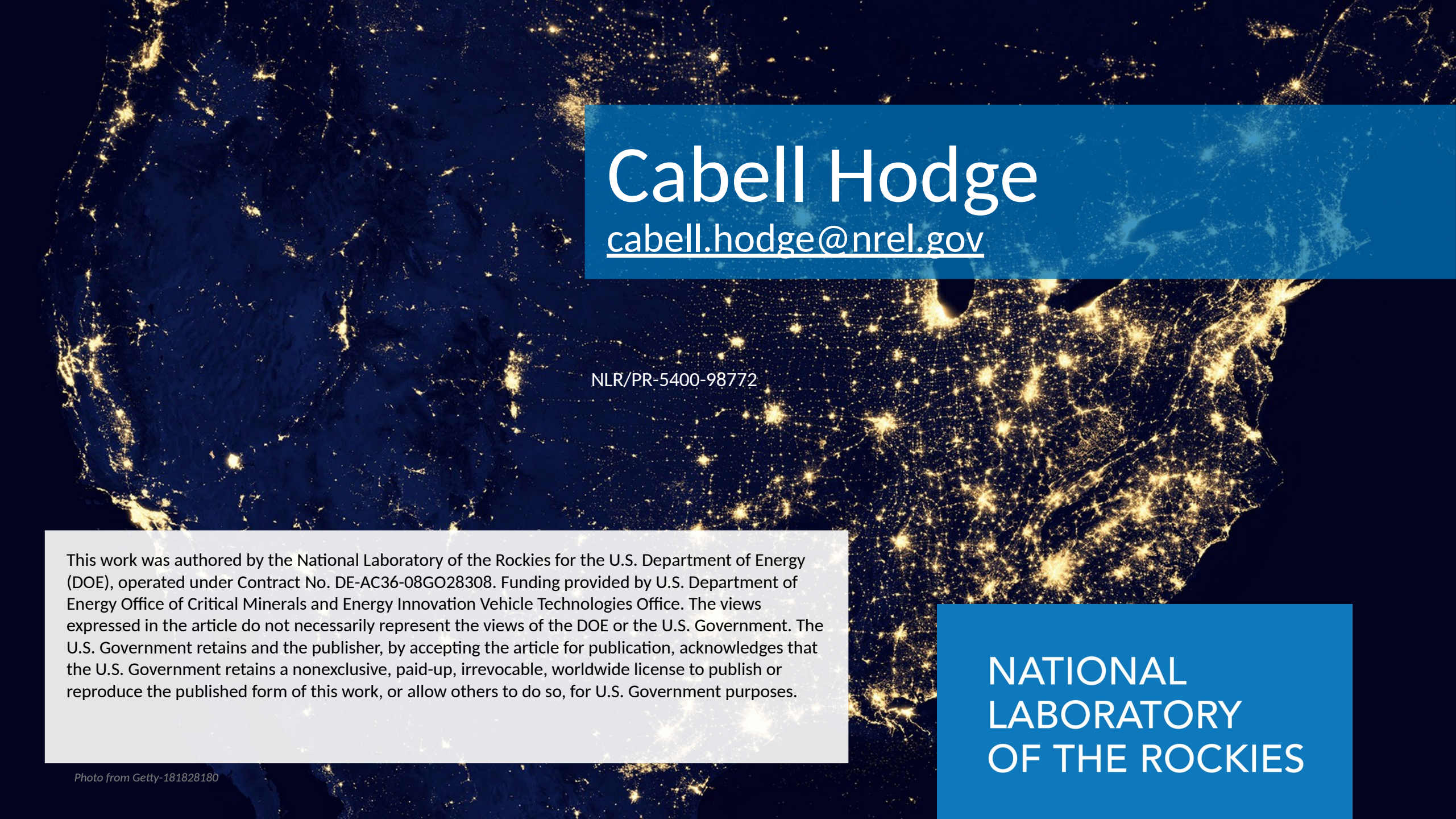
https://fleetredi.nrel.gov/#/dashboard

Cost Analysis and Technical Support

You can email cabell.hodge@nrel.gov with inquiries into tools, vehicle technology, or infrastructure costs

NLR Technical Support





Cabell Hodge

cabell.hodge@nrel.gov

NLR/PR-5400-98772

Photo from Getty-181828180

NATIONAL LABORATORY OF THE ROCKIES

Next SMARTE Webinar Session:

Right Sizing for Procurement/Deployment Needs

Wed., 3/18/26, 1 p.m. CT

Presenters:

- Mike Roeth, NACFE
- Ryan Bankerd, UPS

Register here in Microsoft Forms: https://forms.microsoft.com/r/xWBmrLFkfw

Image provided by Getty

Contact Us

Trey Pope
Transportation/Air Quality Planner
tpope@nctcog.org | 817-695-9297

Jason Brown
Program Manager
jbrown@nctcog.org | 817-704-2514