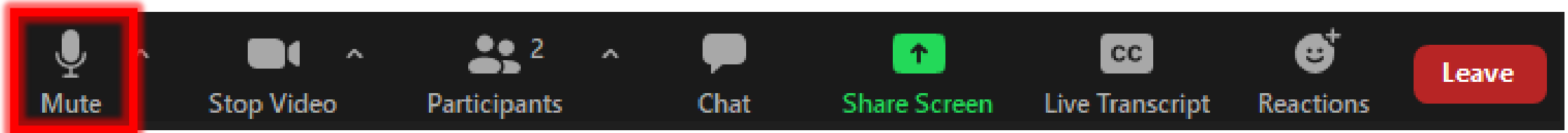


WEBINAR REMINDERS

- Please **Mute** your microphone unless speaking.
- You can place questions in the **Chat** which will be answered in the chat and during the Question/Answer Session at the end.
- You can use the **“Raise Your Hand”** feature to ask questions or make a comment during the Question/Answer portion of the webinar.
- This meeting will be **Recorded**.





North Central Texas
Council of Governments



Saving Money and Reducing Truck Emissions
Webinar Series

Sustainable Solutions for Small Fleets

Date: Tuesday, June 20, 2023

Time: 11 AM – 12 PM Central Time

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

Register at <https://nctcog.zoom.us/j/86034708964>

Webinar will be presented through **ZOOM**

Contact: Jason Brown, jbrown@nctcog.org



Presenters:

Won-Moon Joo

AmpControl

Dr. Ann Xu

ElectroTempo

OVERVIEW



Image provided by Getty

Welcome, Introduction

Presenter: Trey Pope, Transportation Air Quality Planner, NCTCOG

Intelligent Electric Vehicle Charging for Fleets

Presenter: Won-Moon Joo, Business Development Manager, Ampcontrol.io

Charging Network Planning and Intelligence

Presenter: Dr. Ann Xu, Founder and CEO, ElectroTempo Inc.

Q&A Discussion

Local Updates and Close



Saving Money and Reducing Truck 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

SMARTTE

Saving Money and Reducing Truck Emissions



Intelligent EV Charging for Fleets



Our Leadership Team

Confidential

We're energy and AI engineers pioneering the future of intelligent vehicles.



Joachim Lohse
CEO & Founder

Former energy consultant at PwC. Also worked for Siemens and Mercedes.



Bela Patkai
CTO

Ph.D. in AI and Postdoc at the University of Cambridge. 15 years of engineering experience.



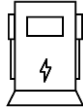
Jonas Schlund
VP Solutions

Ph.D. in Computer Science with a focus on electric vehicle charging. Prior experience at Siemens and Seat.

Ampcontrol is backed by



Electrification of fleets is expensive, unreliable and hard to operate.



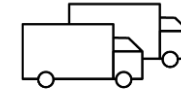
High Charger Downtime

Only ~72% uptime at public charging hubs



High Energy & Power Costs

Up to 60% lost savings without software



Weak Monitoring

Fleet operators fear late departure of vehicles

AI-Powered software connects and optimizes charging for fleets



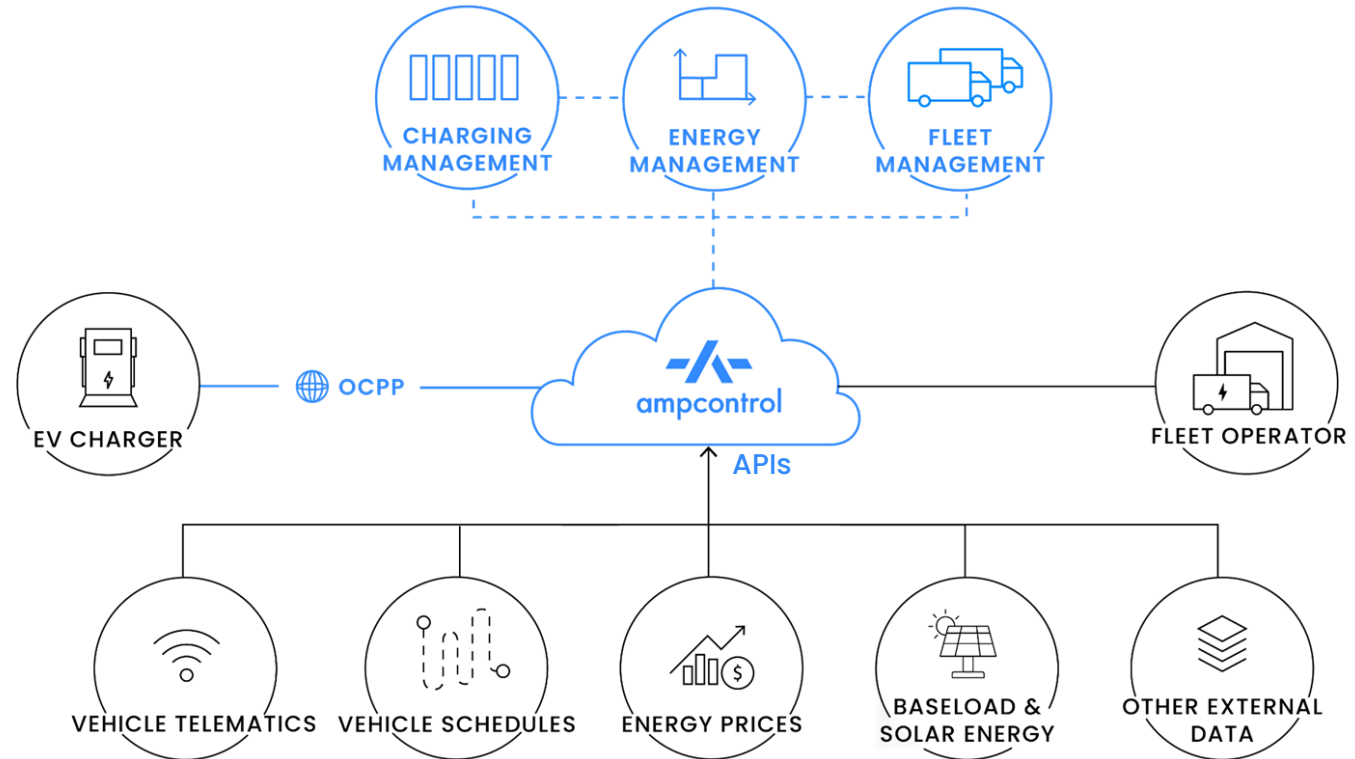
Connect chargers, vehicles, prices etc.



Unique optimization algorithms



No hardware required



24/7/365 Monitoring Service

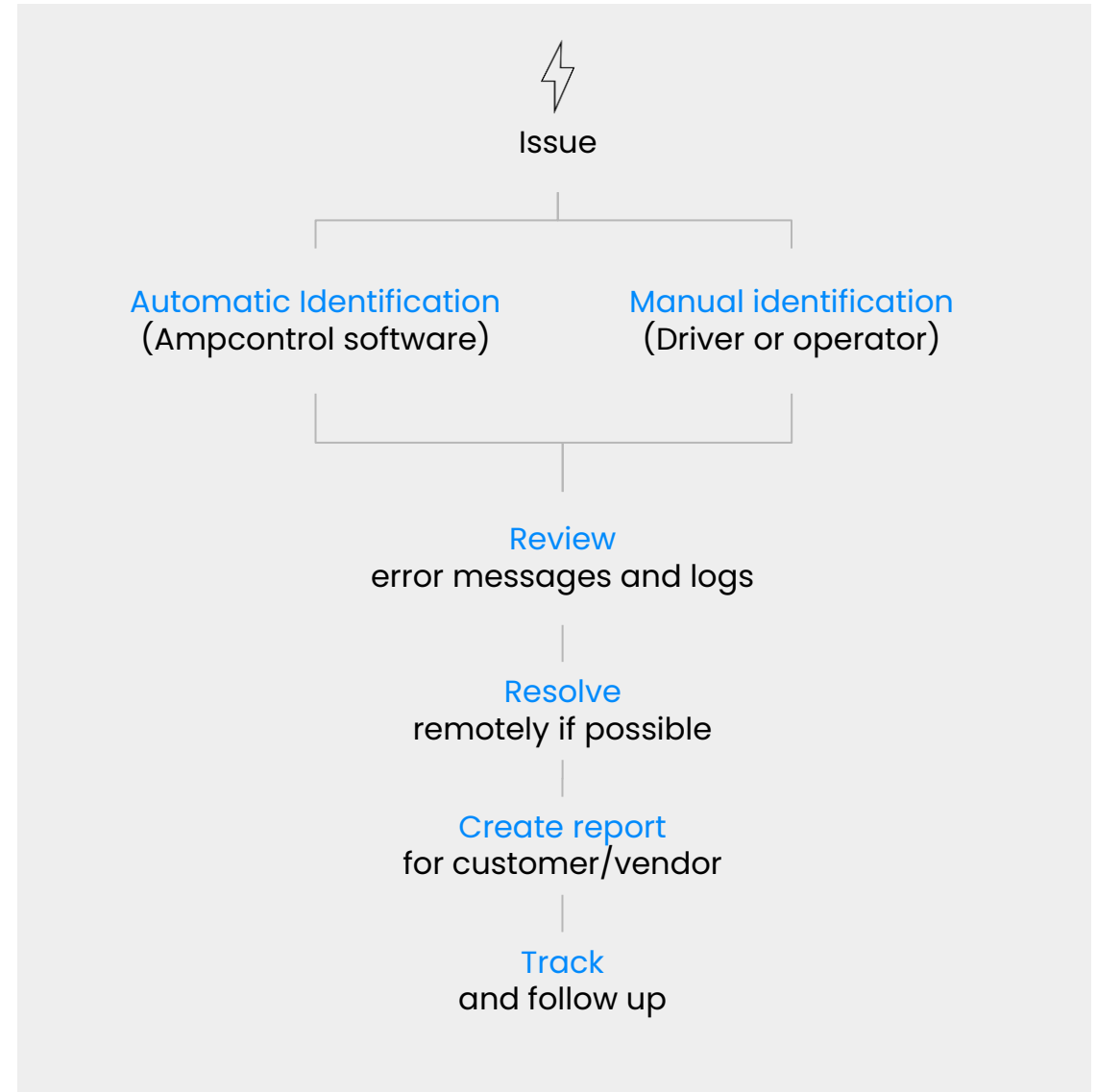
Confidential

Ampcontrol monitors charging hardware to increase uptime and avoid hiring/training for customers.

- ★ 24/7 on-call service + instant response
- ★ Support ground operator and driver
- ★ SLA for response time (P1, P2, P3)

Example SLA

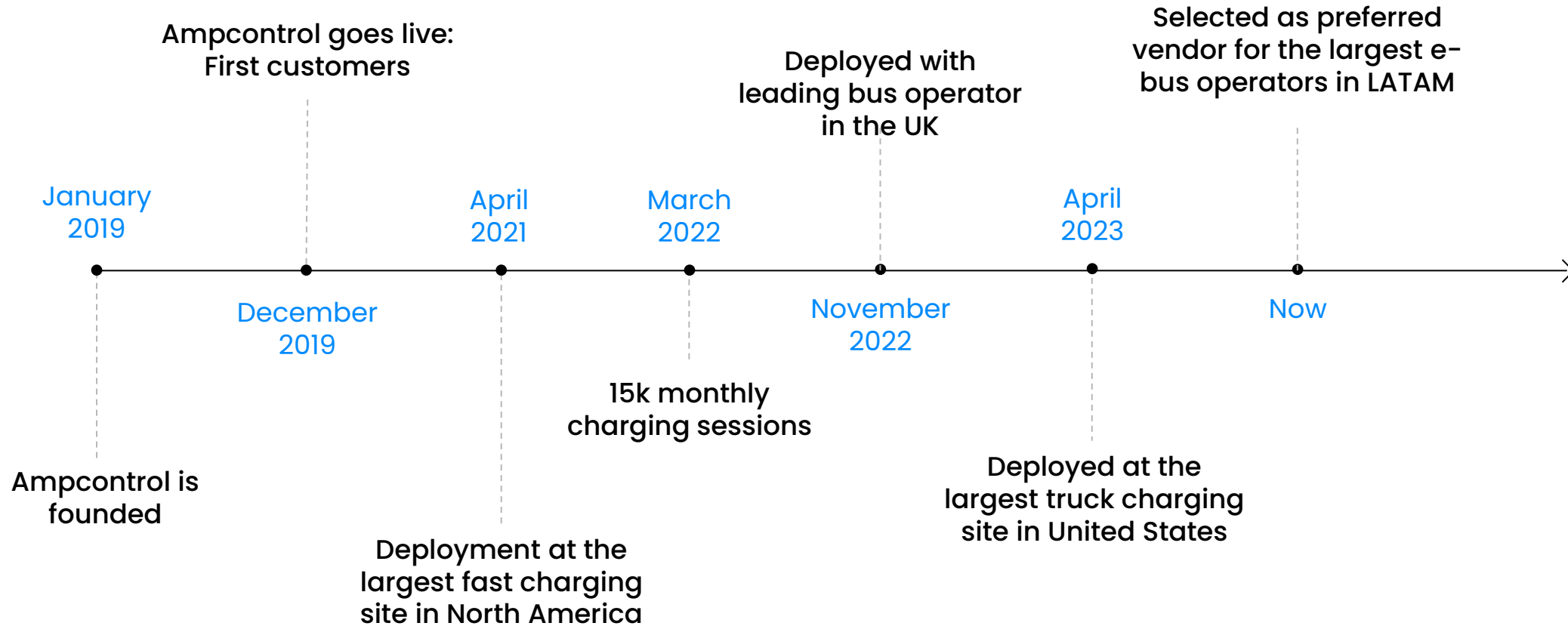
P1:	Instant notification, < 4 Hrs
P2:	<9 Hrs
P3:	<24 Hrs



Our Trajectory

Confidential

We launched in 2019 with our first customers and are working with largest operators across the world.



High product uptime for reliable energy management

Confidential



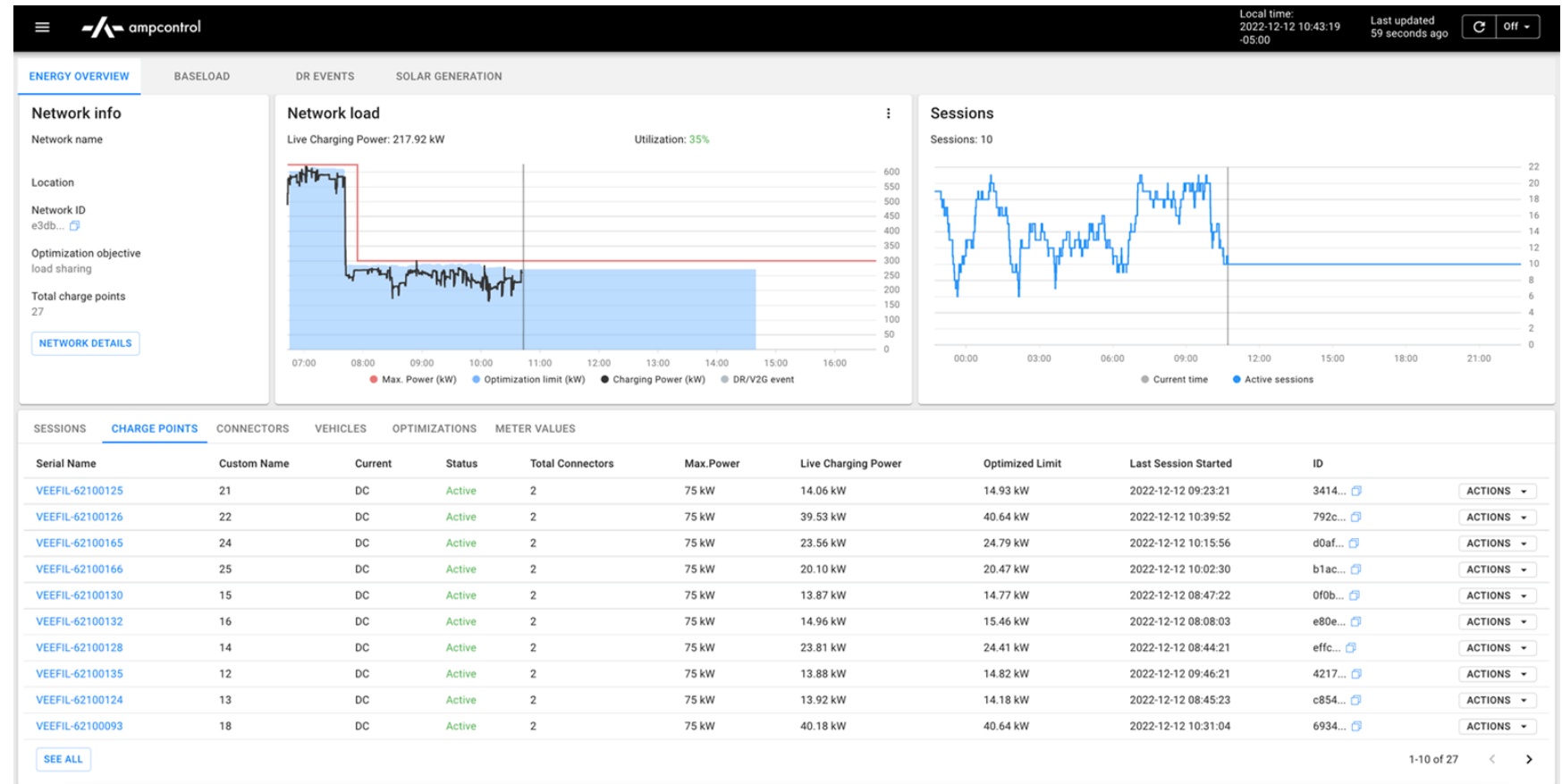
7.5m charger messages processed per month



Best-in-class product uptime (>99.995%)



Tested with 20 leading hardware brands

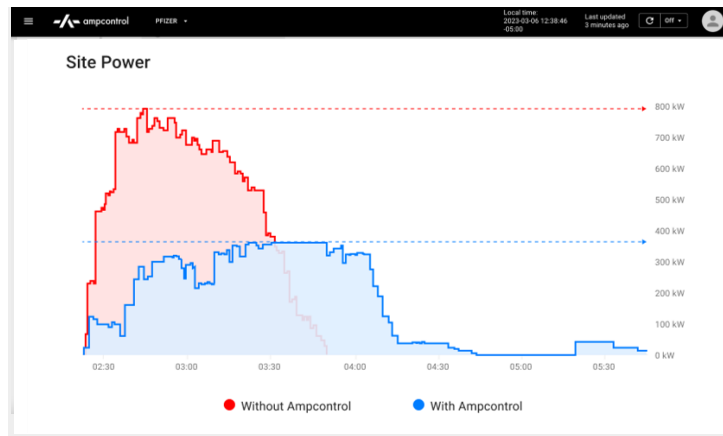


Fleets powered by Ampcontrol see significant improvements in their operation

revel

Saves 55% on fuel costs

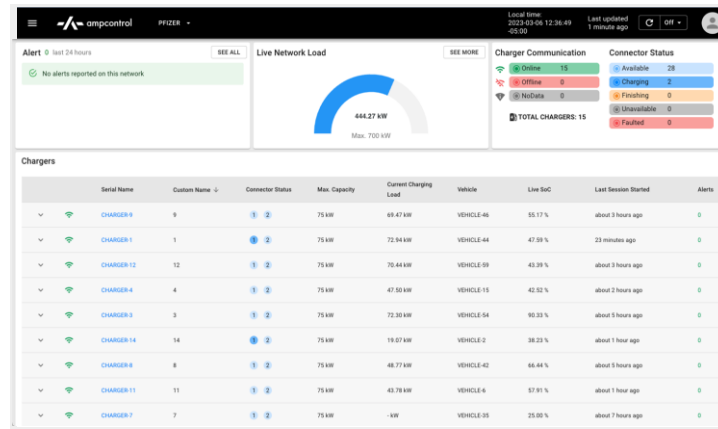
Avoid power upgrades and shift to off-peak pricing



First Bus

100% on-time departure

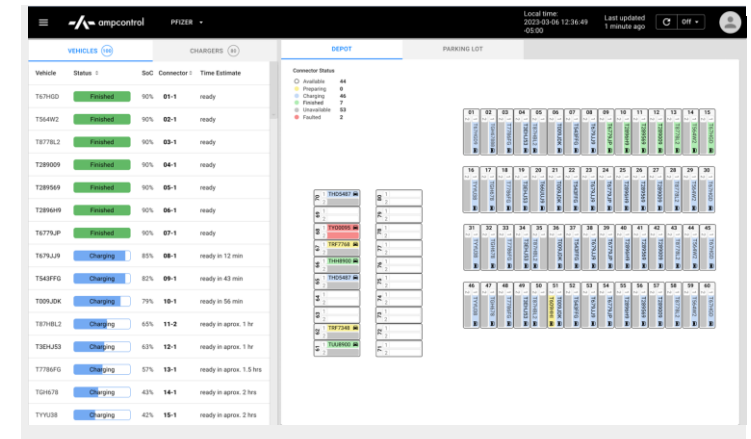
No late departures and downtime. Use of negative spot pricing for free charging



WattEV

Saves on hiring & training

Uses 24/7/365 monitoring service instead of hiring/training operators.



Case Study: *revel*

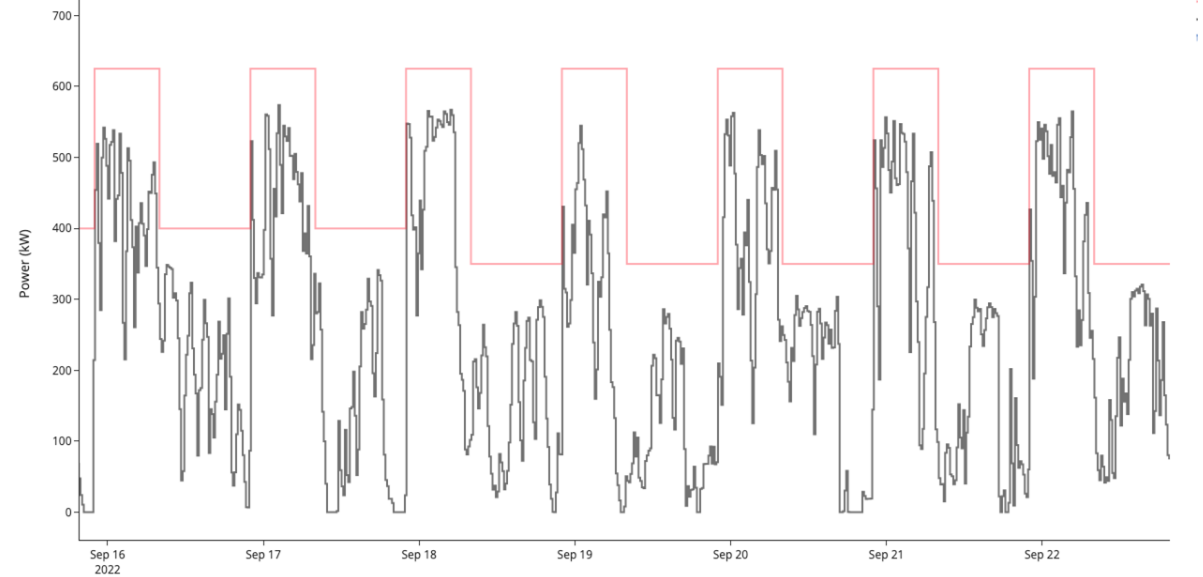
Confidential

Ampcontrol ensures higher charger uptime and reduces costs by >55%.



- ★ >55% saved energy costs per month
- ★ >100k charging sessions per year

Site Power Output (1 week)



Ampcontrol significantly reduces energy costs by constraining the site's power output at different time of the day. This reduces Demand Charges and optimizes charging depending on TOU rates.

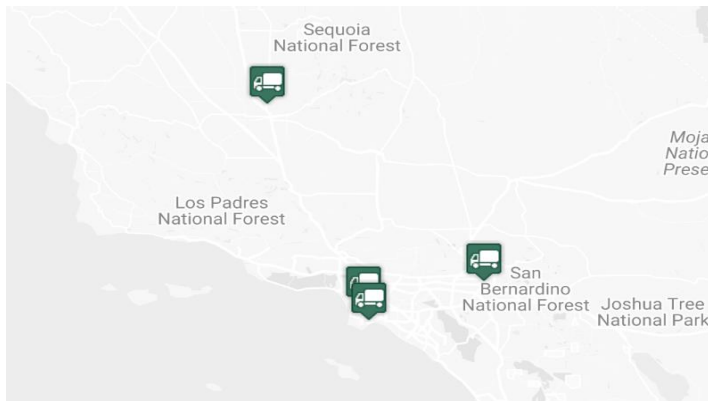
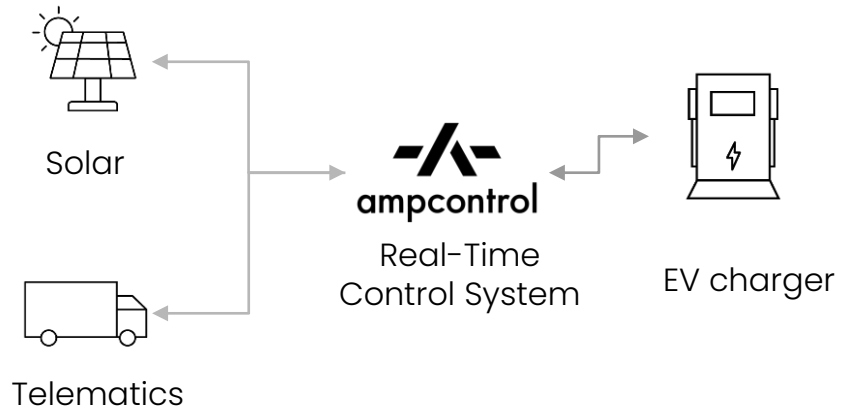


Case Study: **WattEV**

Confidential

WattEV selected Ampcontrol to optimize all their charging sites in California, incl. the largest planned electric truck hub in California (up to 40 MW).

WattEV has announced partnerships with UberFreight and CHEP



- ★ **Largest truck charging site 2023 in California**
- ★ **GeoTab telematic integration**
- ★ **Ampcontrol: CMS, optimization, and 24/7/365 monitoring**



Jackson County School District selected Ampcontrol to monitor and optimize the charging of their electric school busses



V2B Pilot in 2023

Ampcontrol and Jackson County S.D. are working with Navistar and In-charge to determine the feasibility of V2B peak shaving at their football stadium during sporting events



Electrada is market leader in the **Charging-as-a-Service** for C&I electric vehicle fleets within the United States. Electrada services include: design, build, own, operation and maintenance of charging infrastructure



Publicly Announced Projects

★ National Commercial Fleets



★ University Shuttle Services



★ Utility Microgrid Innovation Center



www.ampcontrol.io



ampcontrol

Questions?

Won-Moon Joo, Ampcontrol.io



wonmoon@ampcontrol.io





electrotempo

*Charging Network
Planning & Intelligence*

ElectroTempo.com



ElectroTempo accelerates & future-proofs investments for electric vehicles

Product Summary

Machine learning tools that optimize the total cost of ownership for EVs and associated infrastructure.

Traction

Our software supports clients in deploying and managing EV infrastructure across the fleet, site host, and utility space

Active Customers

We're experts in EV and utility technology



Dr. Ann Xu
CEO



Senior Technical Advisor for
Impact & Assessment



Assistant Director of Technology:
Center for Advancing Research in
Transportation Emissions, Energy,
and Health



Operations Director:
National Center for
Sustainable Transportation



Patrick Finch
COO



Technology
Go-To-Market Lead



Director, Professional Services:
Utility and Commercial Real
Estate Programs



Associate:
Department of Energy
Public-Private Partnerships



Suresh Rajagopalan
CTO Advisor



Senior Data Architect for
IMPACTS Analytics Platform



Senior Cloud & Data Architect:
Department of Labor, ARPA-E
& General Services Administration

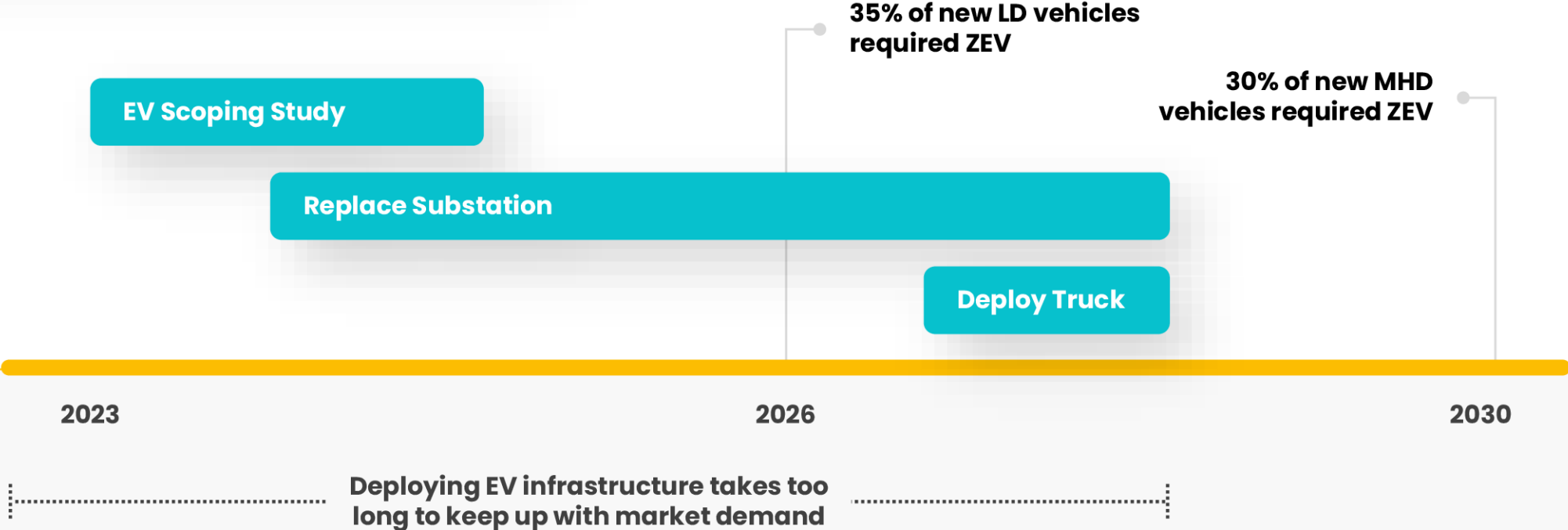


Principal Architect at Infosys
Senior Architect as part of
T Rowe Price Retail Data team

Infrastructure obstacles delay EV deployments

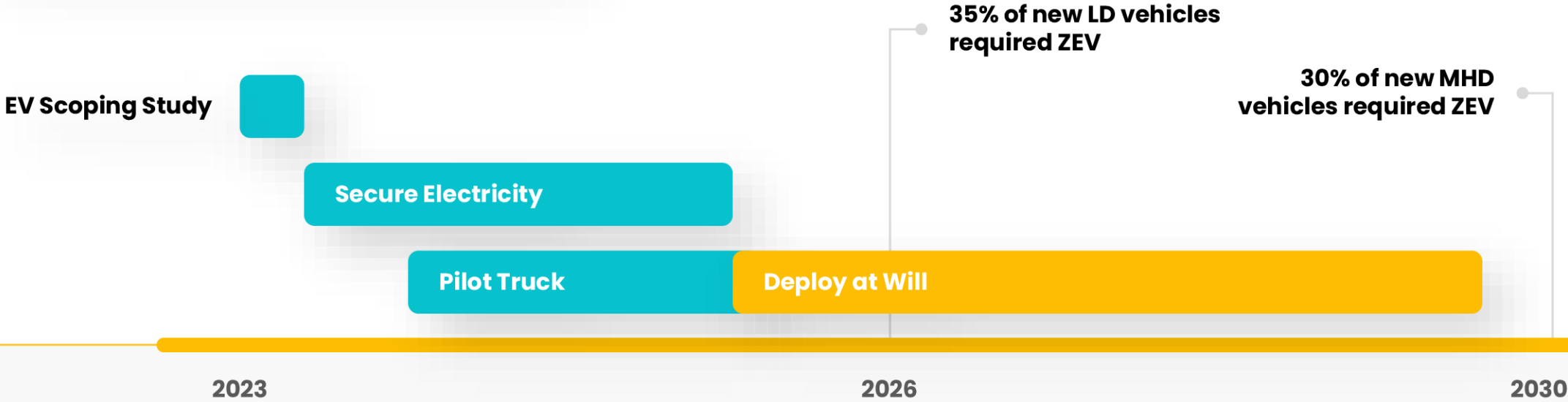
1 - 4 Years

Timeline to Deploy 1st Truck (Fleets)



... reducing deployment time by over 50%

~~+ 4 Year~~
0.5 - 1 Year
Timeline to Deploy 1st Truck
(Fleets)



..... 1st Truck

ElectroTempo's ML tools target electrification bottlenecks to dramatically cut deployment time and improve operational efficiency and TCO by up to 40%. Annual electricity expenditure savings: ~\$150k per site

Public policy has cemented EV adoption

Selected Policies, Regulations, and Subsidies

Inflation Reduction Act / US DOT Vehicle Fuel Economy Standards / US EPA Greenhouse Gas Standard

Plug-In Electric Drive Motor Vehicle Credit / Infrastructure Investment and Jobs Act

Federal Fleet Electrification / 47 State EV & Charging Incentive Programs



- Environmental Topics ▾
- Laws & Regulations ▾
- Report a Violation ▾
- About EPA ▾

Regulations for Emissions from Vehicles and Engines

[CONTACT US](#)

Regulations for Emissions from Vehicles and Engines

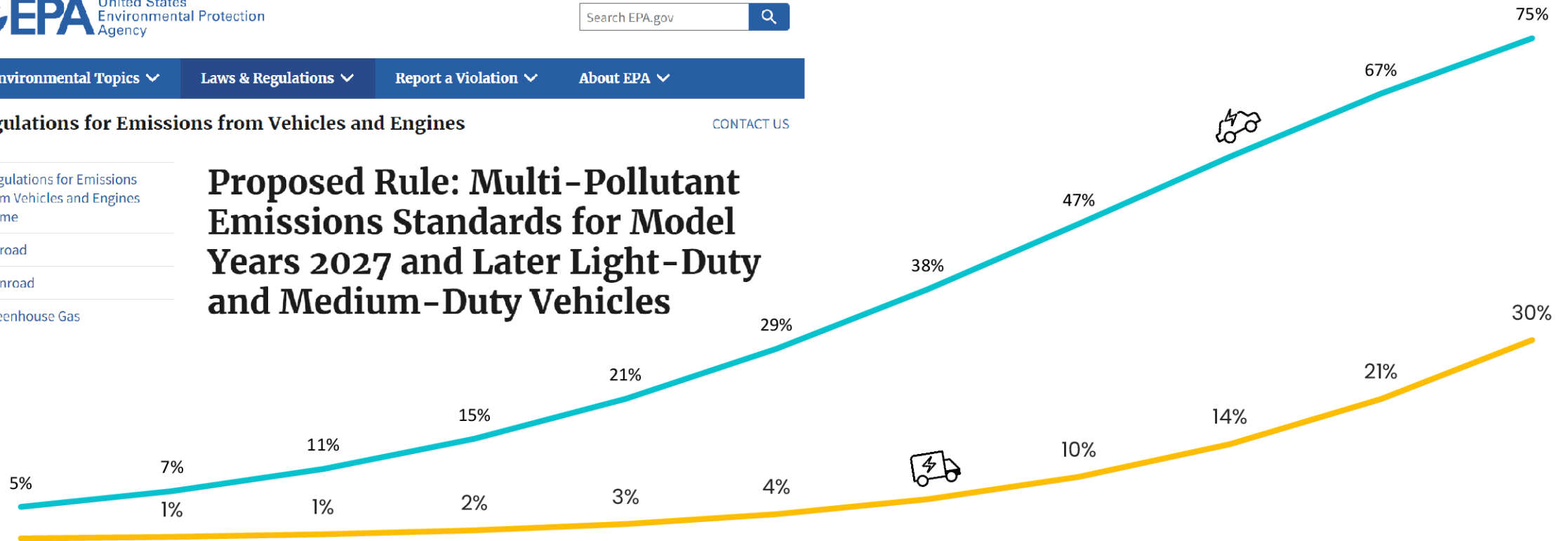
[Home](#)

[Onroad](#)

[Nonroad](#)

[Greenhouse Gas](#)

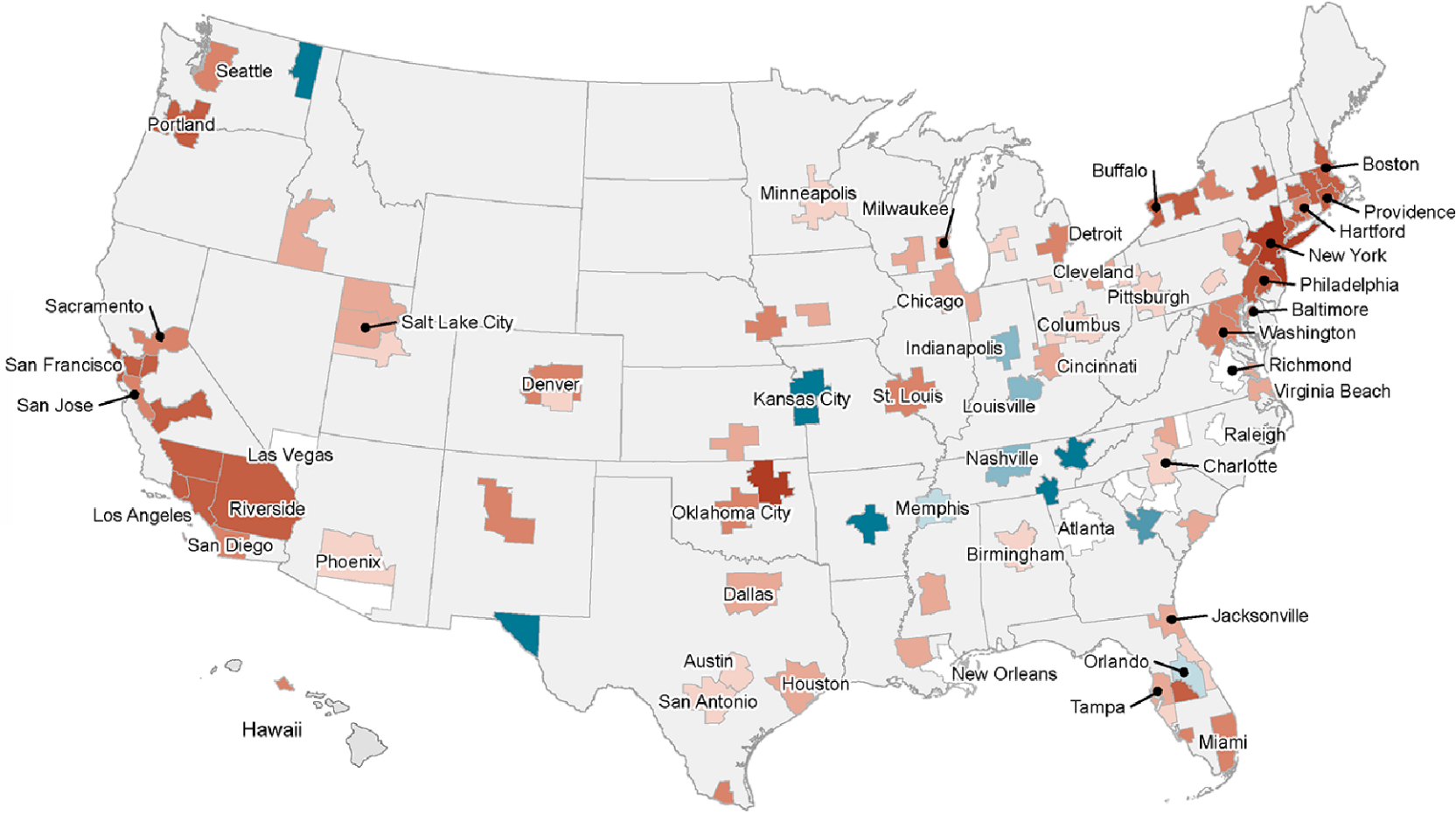
Proposed Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles



...but charging infrastructure is the bottleneck

12.9 Million

Charging Ports Needed
By 2023



Charging infrastructure in 2017 as a percentage of that needed by 2023

1%–10%	11%–20%	21%–30%	31%–40%	41%–50%	51%–60%	61%–70%	71%–80%	81%–90%	91%–100%
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Fleet demand can be unlocked by solving the infrastructure challenge



Initial Customers

Current Market

Future Market

Key Need: Ensure grid can handle projected charging demand

Timing: Now



Need Grid Connectivity

Key Need: Meet Fleet customer requirements while balancing utility needs

Timing: Now



Need Charging Infrastructure

Key Need: Policy mandates requiring ZEV adoption

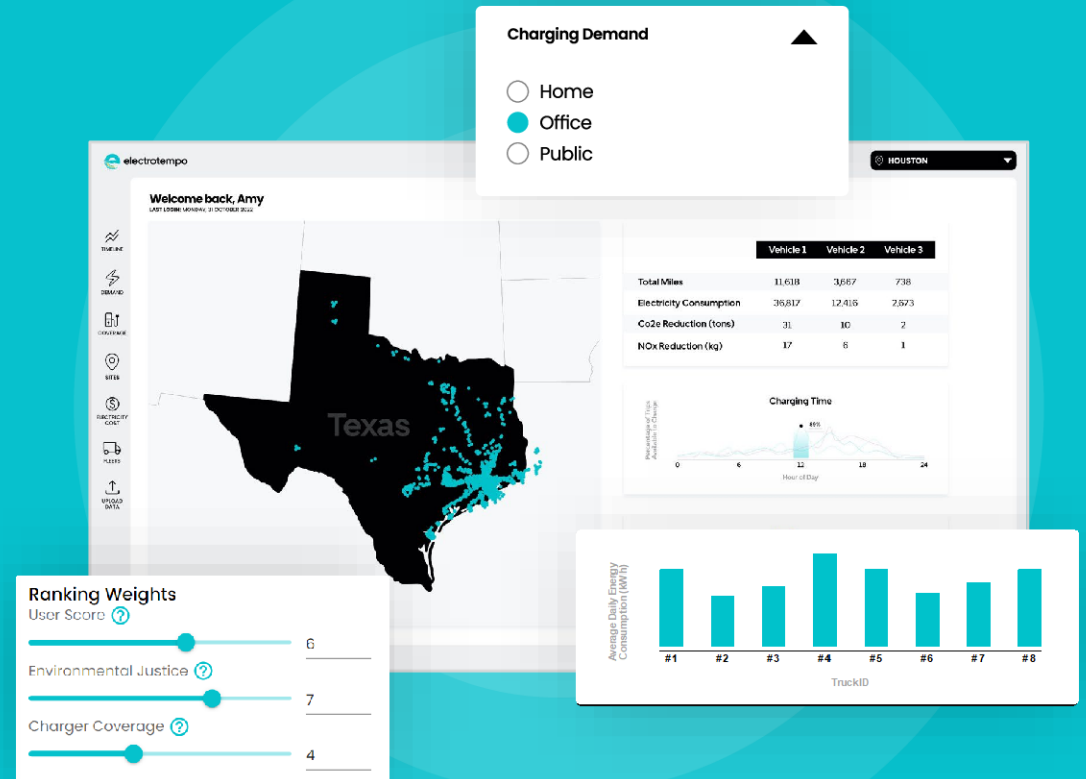
Timing: Contingent on Infrastructure installation



INTRODUCING



- Charging Network Planning & Intelligence
- Grid Forecasting & Optimization
- Fleet Planning & Operations



ElectroTempo accelerates EV deployment

EV Scoping

- ✓ Vehicle Analytics
- ✓ Infrastructure Analytics
- ✓ Utility Analytics

01

Scoping Analytics

Current Product Suite

Procurement

- ✓ EV Hardware
- ✓ Chargers
- ✓ Electricity Supply

02

Procurement Management

2023 Launch

Operations

- ✓ Routing Optimization
- ✓ Charging Optimization

03

Fleet / Site Operations

2023 – 2024 Launch

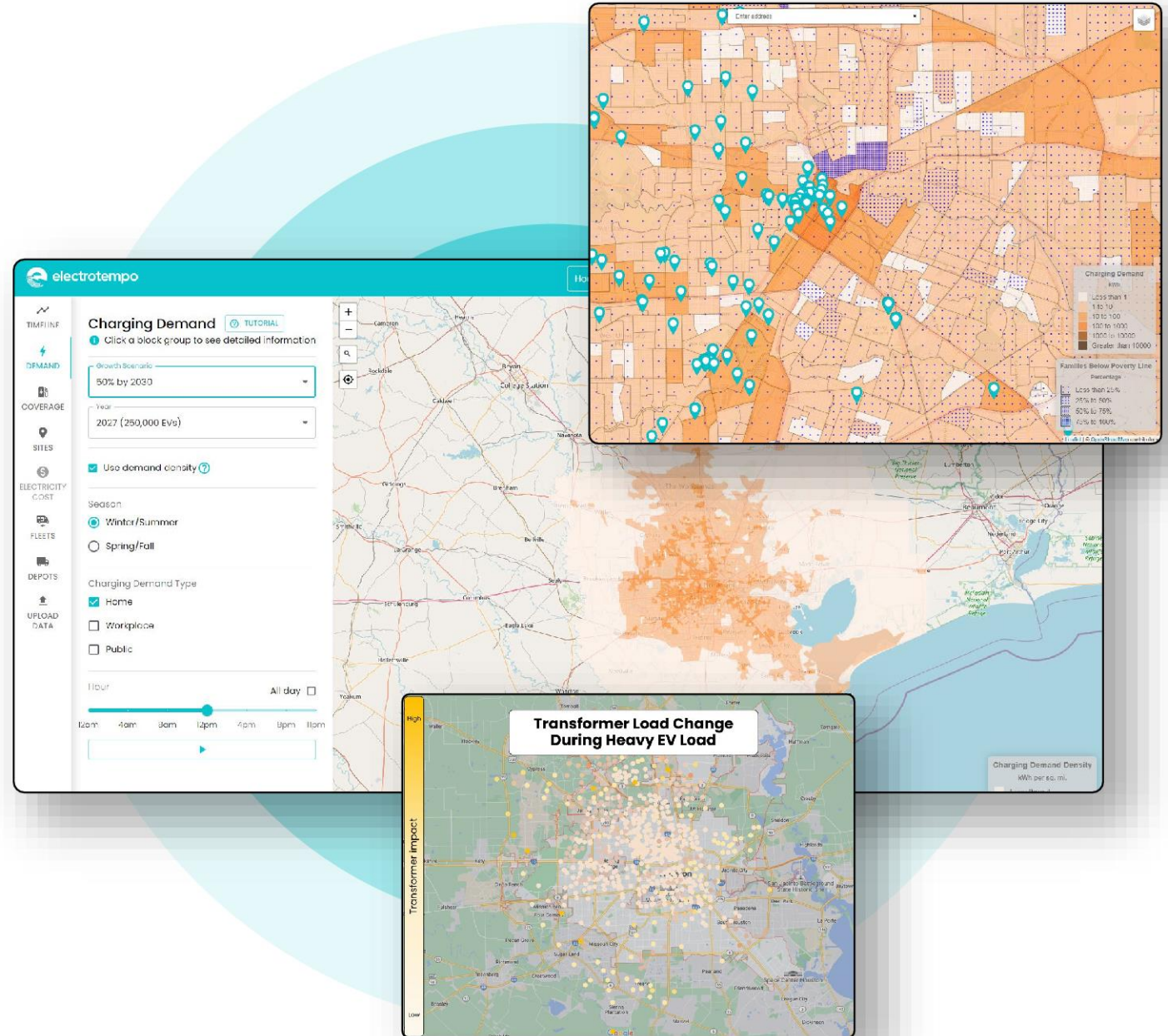
Forecast & Simulate Charging Demand

Long term planning to anticipate charging demand, with demographic data ensuring equitable investment.



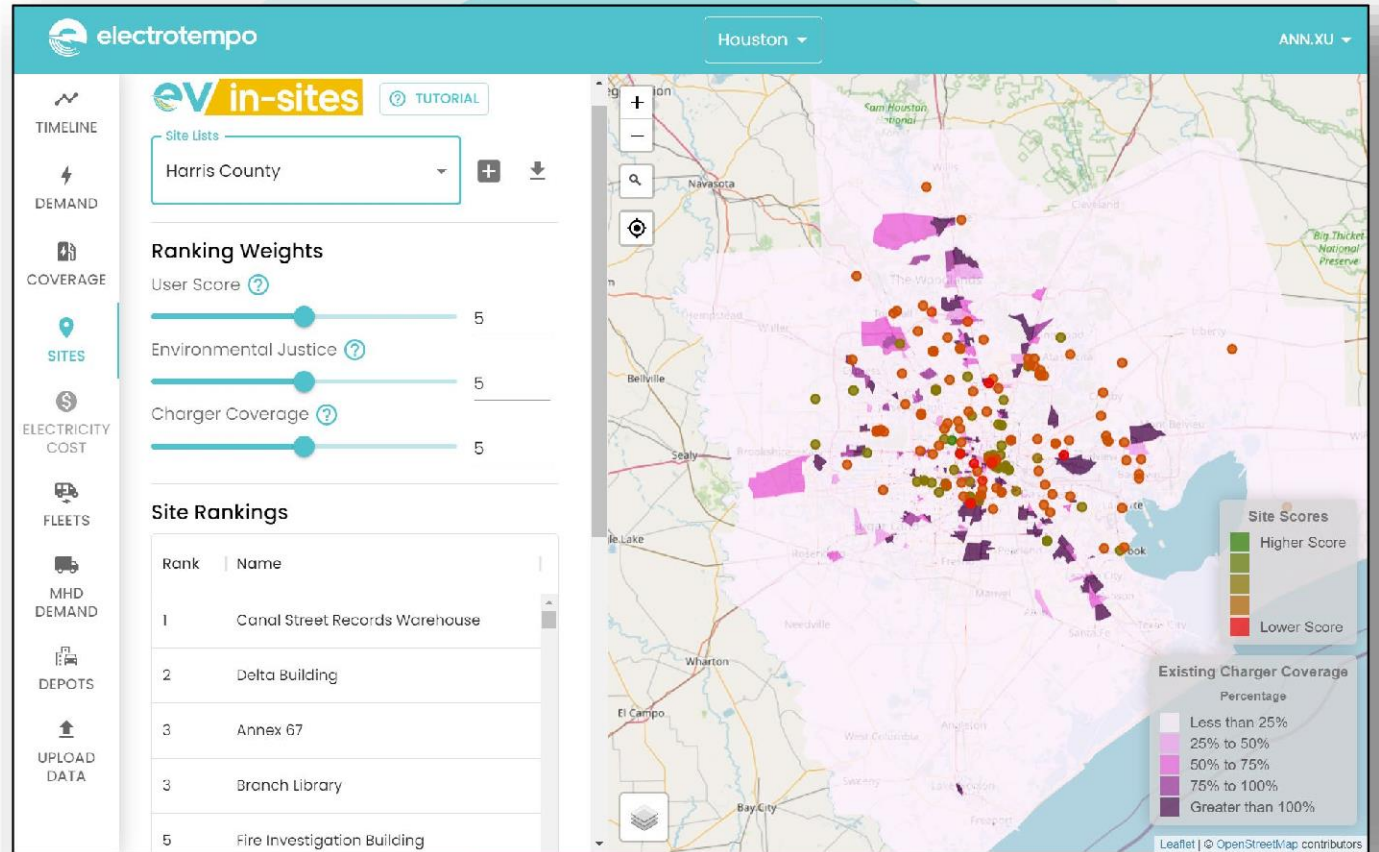
Prevent Utilities from Becoming the Bottleneck

Overlay electrification demand on grid infrastructure models to identify areas where reliability may be at risk.



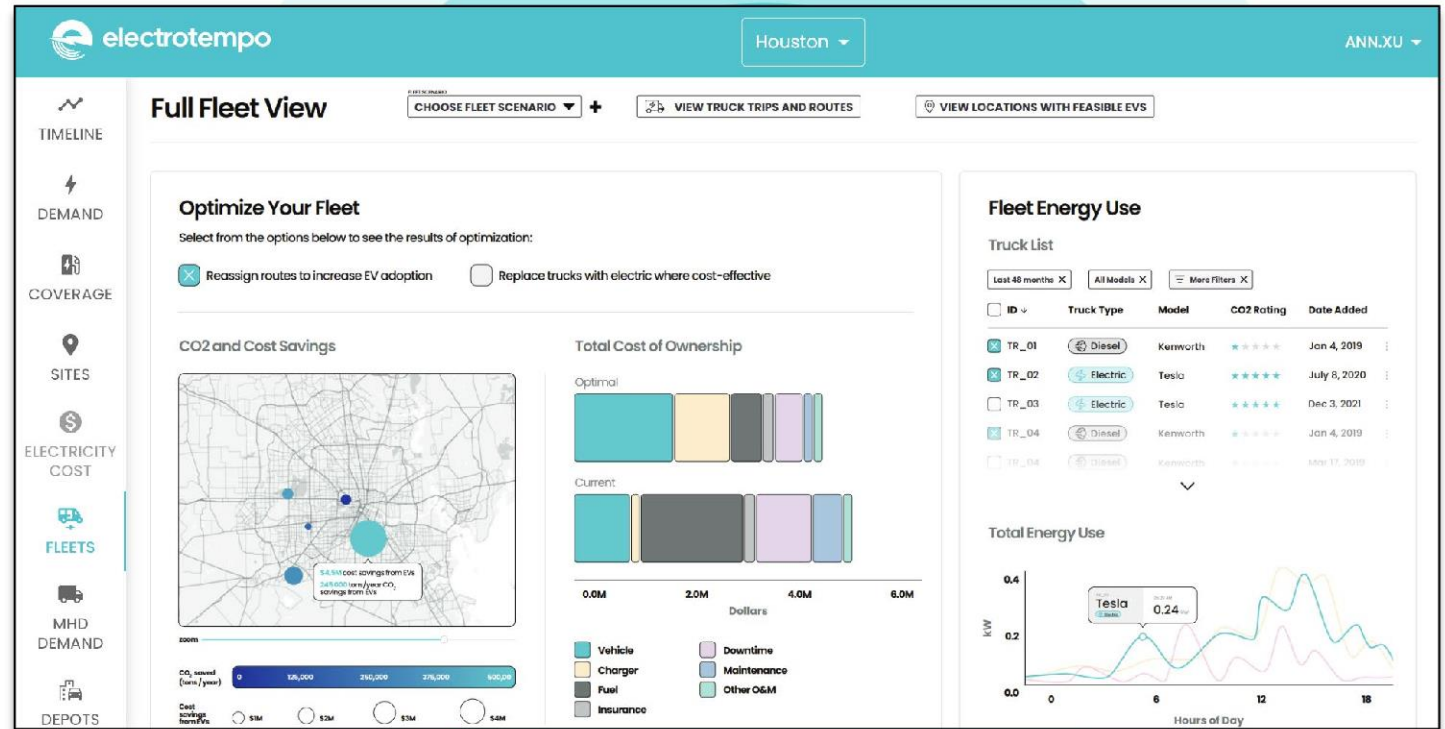
Site Host Analytics for Demand Projection & Project Underwriting

Provides infrastructure providers and site hosts a shared view to evaluate locations that may be suitable for EV Infrastructure deployment.



Fleet Module to Optimize Installation & Operations

Enabling fleet owners to evaluate and manage the total costs and emissions of operating an EV fleet at scale.



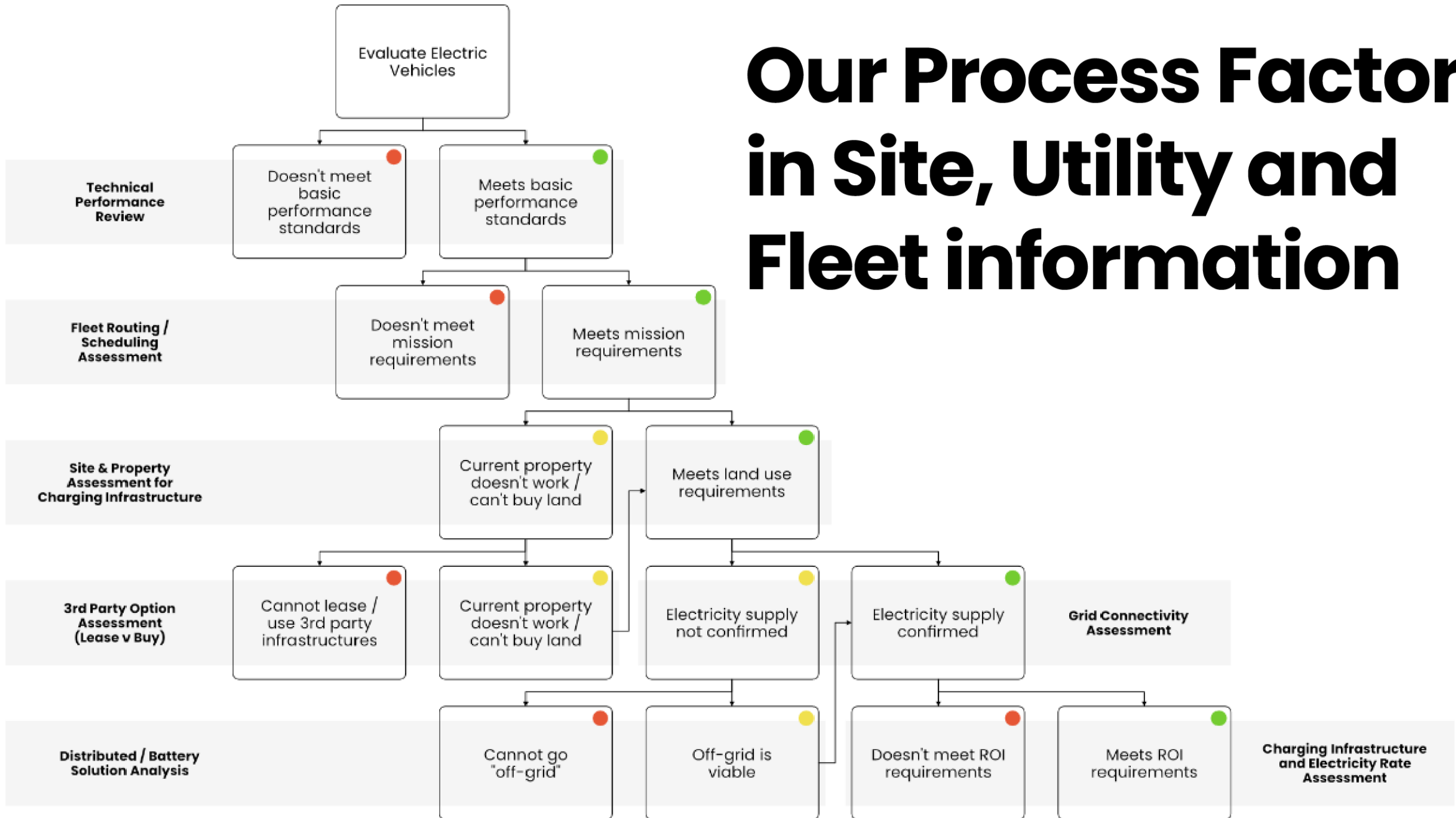
Fleet Assessment

Electrification for smaller fleets has unique challenges

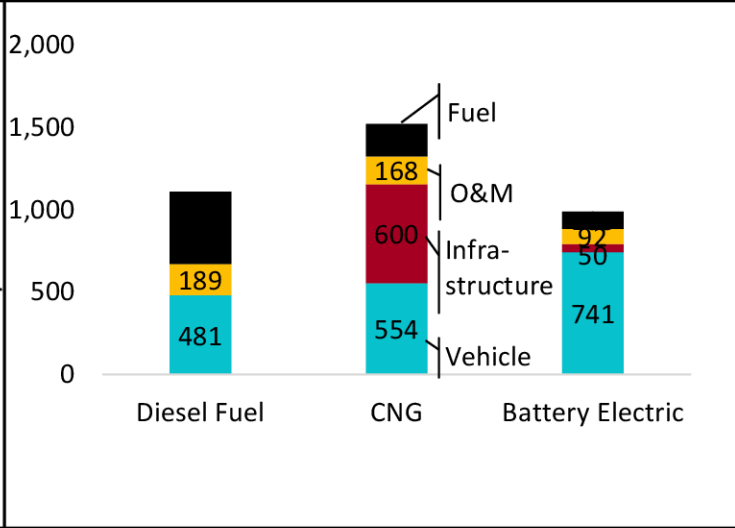
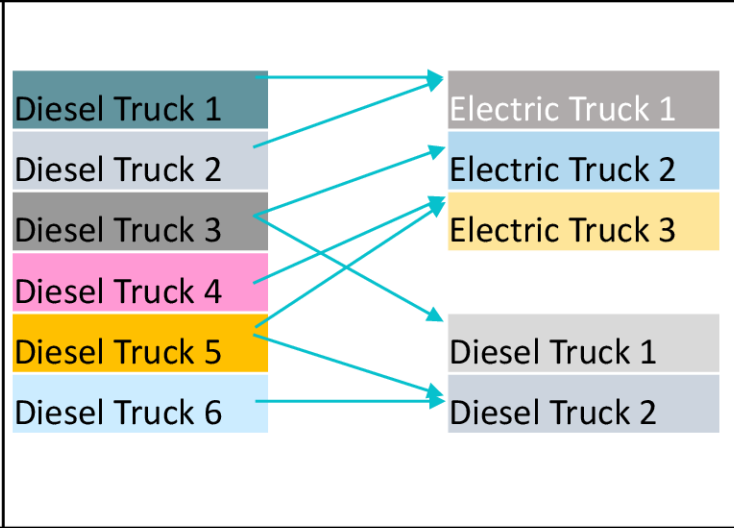
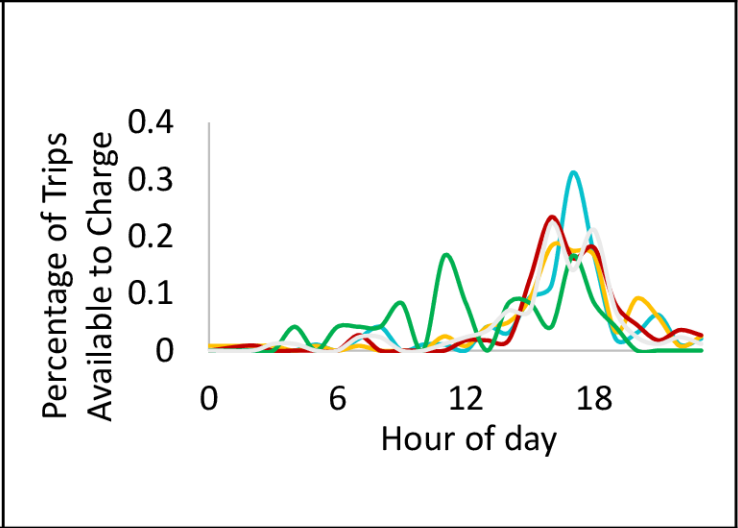
- Problem: EVs and Charging Infrastructure are expensive! Especially if grid costs are added
- Small fleets are less likely to be able to afford new vehicles and infrastructure
- Used EV market for Med/Heavy trucks does not exist yet
- Key is to leverage 3rd party infrastructure, not try to meet all charging needs "on depot site"
 - Job Site
 - Public Charging

	Depot Charging	Job Site Charging	Public Charging
Definition	Charging at owner site	Charging at point of delivery	Corridor charging en-route
Current state/ Challenges	Majority of market. Expensive	Developing market. Charging as Service	Early stages. Not widely available
ElectroTempo Capability	Can help site/scope infrastructure and optimize fleet	Supporting warehouse owners in deploying infrastructure	Database of existing chargers

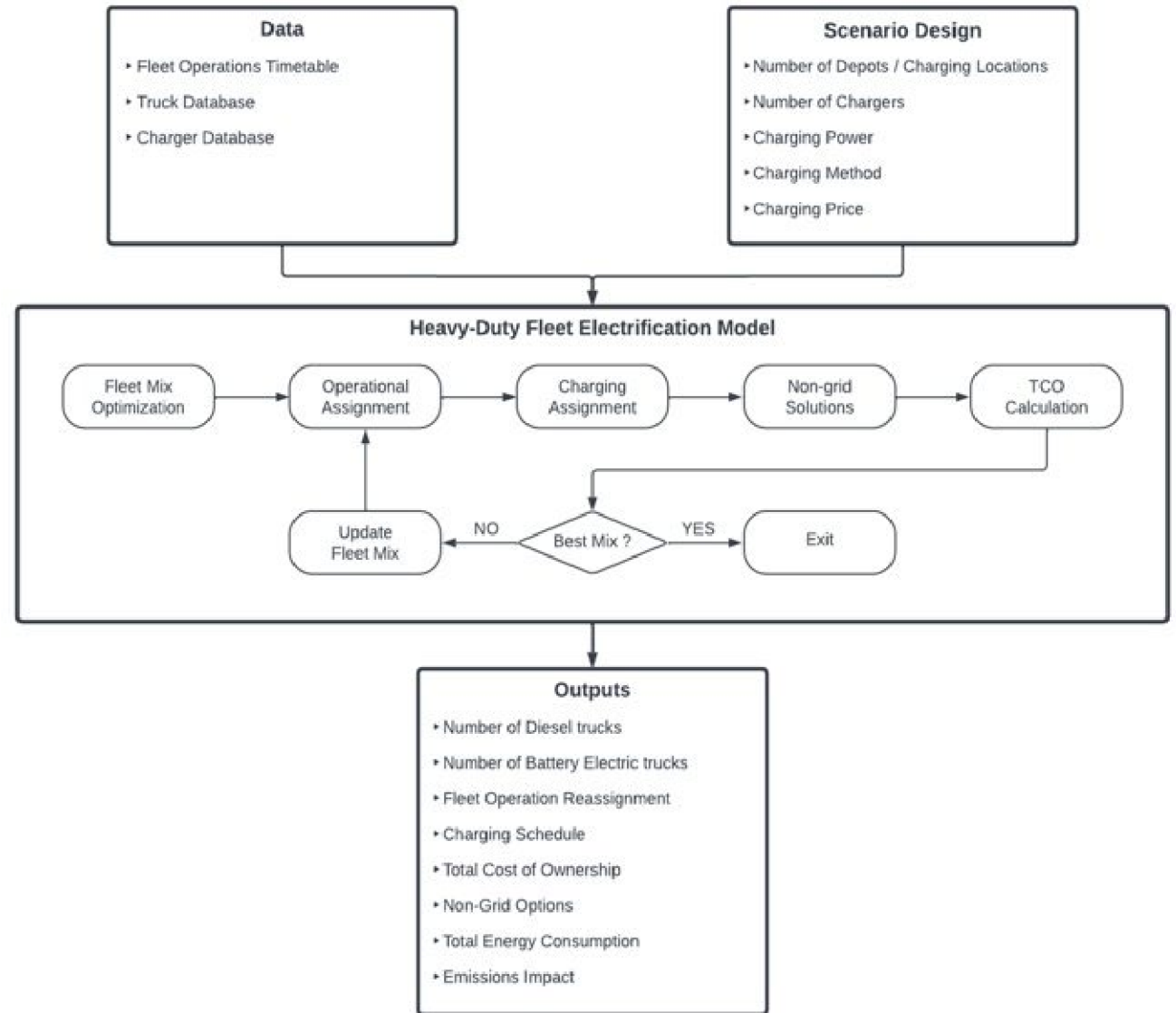
Our Process Factors in Site, Utility and Fleet information



For Fleets: Feasibility Assessment and Operational Optimization

Tool	Economic Analyzer	Route Optimizer	Charging Scheduler
<p>Example</p> <p>Total Cost of Ownership \$K</p> 			
<p>Fleet concerns</p>	<ul style="list-style-type: none"> • How quickly will my investment pay back? • When does it make sense to co-deploy renewables and storage? 	<ul style="list-style-type: none"> • How many and what type of electric trucks do I need to meet my operational needs? • Which routes are best suited? 	<ul style="list-style-type: none"> • How many and what type of chargers do I need? • Which depots are best suited? • When should trucks charge?

Fleet Electrification Optimization Workflow

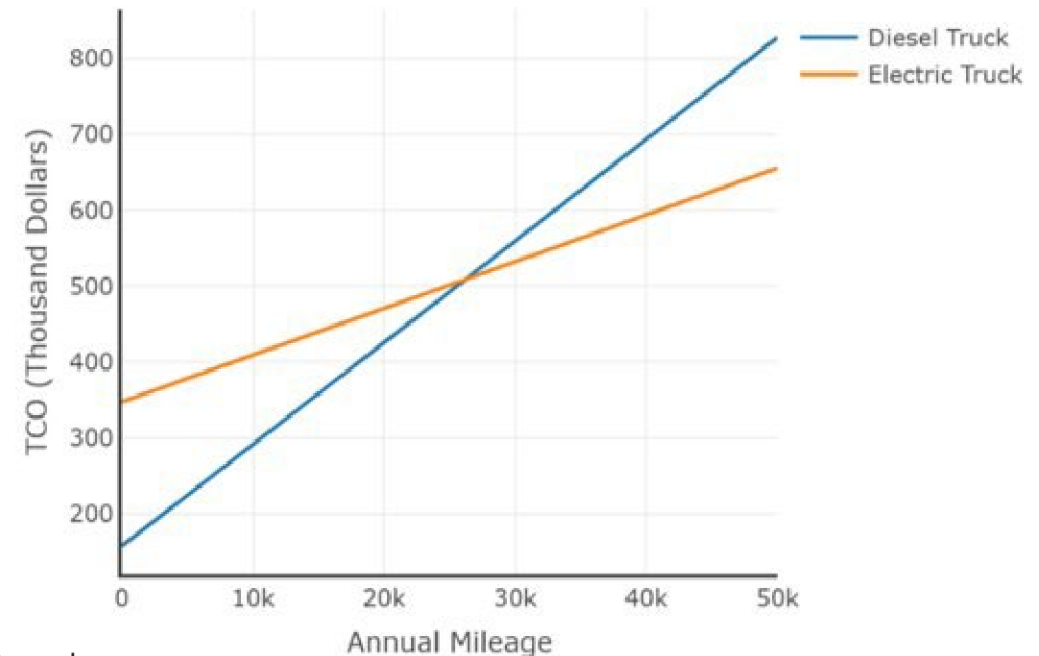


Financial Analysis Toolkit

Key considerations

- Up-front cost analysis
- Fuel (traditional, electricity and/or hydrogen) cost analysis
- Maintenance cost analysis
- Lifetime cost analysis
- Net present value and payback period
- Sensitivity to key factors including incentives and fuel prices

Total Cost of Ownership Model



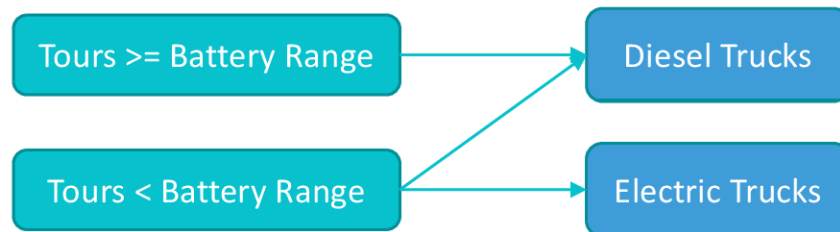
Based on:

- Database of vehicle and charger models
- Calculations to justify incentive applications

Routing and Charging Scheduling Optimization

Key considerations

- Existing operating parameters
- Electric vehicle requirements to meet existing operating parameters
- Necessary operational modifications



Tool capabilities

- Automated calculator identifies range limitations specific to load, grade, and weather
- Identify suitable vehicle models
- Maximize electric truck utilization while balancing cost and operational limitations

Fleet	Current number of diesel trucks	Minimum required number of diesel trucks for long-haul operation	Annual mileage for one electric truck
Fleet 1	15	8	36,436
Fleet 2	8	7	19,997

Example Comparison of Real-world Fleets

Scenario	Optimal Number of Electric Trucks	Optimal Number of Diesel Trucks	Total Cost of Ownership	Change in Cost	Annual Net Emissions Reduction	
					CO _{2e} (tonnes)	NO _x (kg)
1	3	13	\$ 8,300,400	\$ 55,934	108	61
2	7	8	\$ 8,154,573	\$ (89,893)	231	131
3	6	10	\$ 8,207,320	\$ (37,146)	202	114
4	1	14	\$ 8,298,541	\$ 54,074	38	21
5	2	13	\$ 8,305,701	\$ 61,235	56	31

Where do we go from here?

- Ultimately fleets will have to rapidly assess where to site new EV charging infrastructure to maximize adoption, equity and emissions reduction impact
- Without the right toolkit to evaluate future adoption scenarios, these decisions will be made with backward looking data that will provide decision-makers incomplete or misleading estimates of how much infrastructure is needed, and where
- ElectroTempo has the toolkit and the capabilities to help you. Contact us for more information: ann.xu@electrotempo.com

www.electrotempo.com

<https://www.linkedin.com/company/electrotempo>

Questions?

Dr. Ann Xu, ElectroTempo



ann.xu@electrotempo.com



Local Updates

SMARTe Vendor Directory

Local Vendors of SmartWay
Verified Technology

Promoted through the
SMARTe Program

Free to join and free to use



Image Provided By Getty



Become a SMARTe Vendor



SELL

Sell SmartWay
Verified Technology



LIST

Provide a list of
SmartWay Verified
Technology offered
that can be made
available



SIGN UP

Complete Vendor
Directory Sign-Up
Form

<https://forms.office.com/r/dfd0zsnS8v>



Dallas-Fort Worth Clean Cities (DFWCC)

DFWCC - Advance Economic, Environmental, and Energy Security

- Increase Efficiency and Reduce Emissions from Transportation
- Partner with Public and Private Fleets
- Structure
 - Fleet & Commercial Strategies
 - Consumer Initiatives
 - Local Government Policies / Community Readiness



**Dallas-Fort Worth
CLEAN CITIES**

Fleet Support - Enable More Efficient, Greener Fleets

- Match Vehicles & Equipment to Funding
- Train on Tools and Resources
- Plan for Fleet Transition – Detailed Recommendations



What We Do



Funding Support

Assist with Navigating Programs and Developing Grant Applications

Administer Funding



Technical Assistance

Maintain and Analyze Data

Hold Webinars, Workshops, Peer Exchange

Develop Best Practices and Template Resources



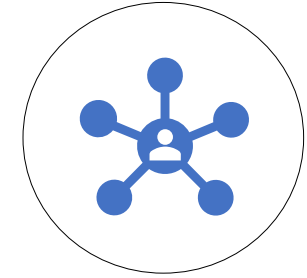
Planning the Future

Alternative Fuel Corridors

Texas EV Charging Plan

ZEV Infrastructure

Organic Waste to RNG Feasibility Study



Raising Awareness

Facilitating Relationships

National Drive Electric Week

Fleet Recognition

Success Stories and Community Events

National Network of Clean Cities Coalitions

More than 75 Clean Cities coalitions with thousands of stakeholders, representing ~80% of U.S. population

Designated by the Department of Energy

Working locally to advance affordable, domestic transportation fuels, energy efficient mobility systems, and other fuel-saving technologies and practices



Get Involved

Website - www.dfwcleancities.org

Upcoming Events - www.dfwcleancities.org/events

Weekly Email Blast - <https://www.nctcog.org/stay-informed>

Sponsor DFWCC - <https://www.dfwcleancities.org/sponsorships>



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