

# Fleet Data Analytics for Best Fleet Management Practices December 12, 2025

- Tim Taylor - Co-director of NorCal Clean Cities – Host & Moderator
- Aaron He – Project Manager of NorCal Clean Cities – Webinar Pilot

## Today's Speakers

- Duane West, California State Department of General Services
- Drake Zwahlen, Business Development Manager, Geotab
- Ron Wirth, Fleet Manager, Sacramento County Fleet Management

## Special Thanks to Our Fleet Partners Making Our Webinars Possible



- *Sacramento Clean Cities Rebranding as NorCal Clean Cities And Communities*
- *Our mission is the reduction of the use of fossil petroleum in the transportation and energy sectors*



# We would like to thank



## Our sustaining sponsors



NAPA is your trusted source for automotive parts, accessories & know how for your car, truck or SUV.



From Expense to Opportunity - Turning EV Adoption into ROI

## Our most recent sponsors



Managing the County's air quality in a manner to protect and promote public health.



A Thomas Built Bus dealership with expertise in bus and truck parts distribution.

## Our most recent members



Enoven Truck Body + Equipment is the premier work truck body builder in the Western United States.



Our mission at RTA is clear—we help fleets succeed through our software, training and consulting

## Our most recent event partners



An American automotive manufacturer that develops and builds category-defining electric vehicles



Providing no-reserve internet auctions for buying and selling new and used equipment and vehicles



An American customizable electric pickup truck that can change into a van or SUV.



North America's leading provider of Electrification-as-a-Service

## UPCOMING EVENTS

- **Fleet Academies**
  - Yuba City - February 4, 9:30 – 2:30 – Yuba City
  - Chico & Redding Dates TBA
  - Major Conference – Cal Expo or Sonoma Raceway – Mid September
- **School Bus Consortium**
  - February 5, 11am – 1:30pm
  - Every two months following
- **Sacramento Region Education Mobility Coalition**
  - SACeMo monthly meetings

## UPCOMING WEBINARS

- 01/22 – CARB ACF Updates
- 1/29 – Geotab Analytics Software for Fleet Management
- 02/19 – Introduction to Regulations Affecting Fleets in California (1 of 2 Part Series)
- 03/19 – Introduction to Regulations Affecting Fleets in California (2 of 2 Part Series)
- 04/23 – EV Charging Station and Infrastructure Development
- 05/21 – How to use Fleet Management Information Software (FMIS) to make data-driven decisions about your fleet
- 06/18 – Fleet replacement strategies for an optimum program and compliance (with ACF)
- 07/16 – How to Market (promote) Your Fleet Operations to Reduce Administrative Workload and Gain Support for Goals and Objectives
- 08/20 – Essential & Critical Fleet Management positions every fleet should have
- 09/17 – How to Advance Your Career in Government Fleet Management
- 10/22 – From Supervisor to Fleet Manager – What Skills, Knowledge, Abilities, and Education is

# Data-Driven Decision Making in the California State Fleet

Duane West  
Fleet Policy and Reporting Manager  
Department of General Services  
Office of Fleet and Asset Management

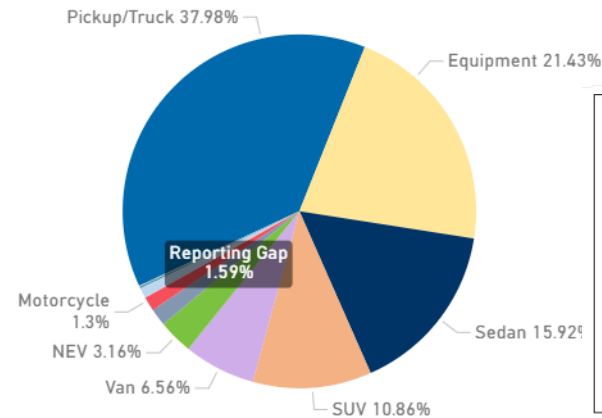
# How the State Uses Data to Drive Fleet Decisions

Fleet Composition Reporting

Telematics and reporting analytics

Policy Development and Compliance Review

49,370 Active Fleet Assets	35,288 Active Vehicles	19,258 Light Duty Vehicles
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Department Name

Department of General Services

FAMS Asset Reporting Compliance

99.70%

97.00%

DGS CALIFORNIA DEPARTMENT OF GENERAL SERVICES

For example, how to sell to the state?

HOME SERVICES DIVISIONS & OFFICES RESOURCES PRESS RELEASES CAREERS ABOUT CONTACT

SEARCH ENTIRE MANUAL

Search Manual

PRINT ENTIRE SAM MANUAL

SAM / TOC / 4100 / 4121

## EXECUTIVE ORDER B-16-12 ZERO EMISSION PURCHASING MANDATE - 4121

(Revised: 12/2016)

Pursuant to Executive Order (EO) B-16-12 state agencies are required to increase the number of zero emission vehicles (ZEV) within the state fleet through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty (LD) vehicles are ZEV by 2015 and 25 percent by 2020. In accordance with the Governor's 2016 ZEV Action Plan, beginning in Fiscal Year (FY) 2017/2018, state agencies will be required to increase upon EO B-16-12's 10 percent ZEV purchasing requirement by 5 percent each year through FY 2024/2025. As EO B-16-12 presently directs each state agency to ensure that at least 10% of its annual LD fleet purchases be a ZEV, a state agency will now be required to increase its annual LD ZEV purchasing as follows:

# Telematics Data in Action

## ZEV Range Limitation Exemption

- Telematics Data from Geotab was provided by customer department shows actual usage over the previous fiscal year.
- SMART compared this data to the range of a comparable ZEV model.
- Six vehicles regularly exceeded the ZEV range, indicating a BEV would not meet operational needs.
- Based on this analysis, a ZEV exemption was approved.

Vehicle Utilization   GovGeotab			
Vehicle	Date	Distance Traveled (mi)	Vehicle Driving Hours (hh:mm)
Vehicle 4	7/3/2023	2	0:19
Vehicle 5	7/3/2023	204	4:16
Vehicle 6	7/3/2023	45	0:59
Vehicle 8	7/3/2023	383	6:23
Vehicle 11			
Vehicle 1			
Vehicle 3			
...			
Vehicle 9			
Vehicle 11			
Vehicle 12			
Vehicle 3			
Vehicle 8			
Vehicle 11			
Vehicle 11			

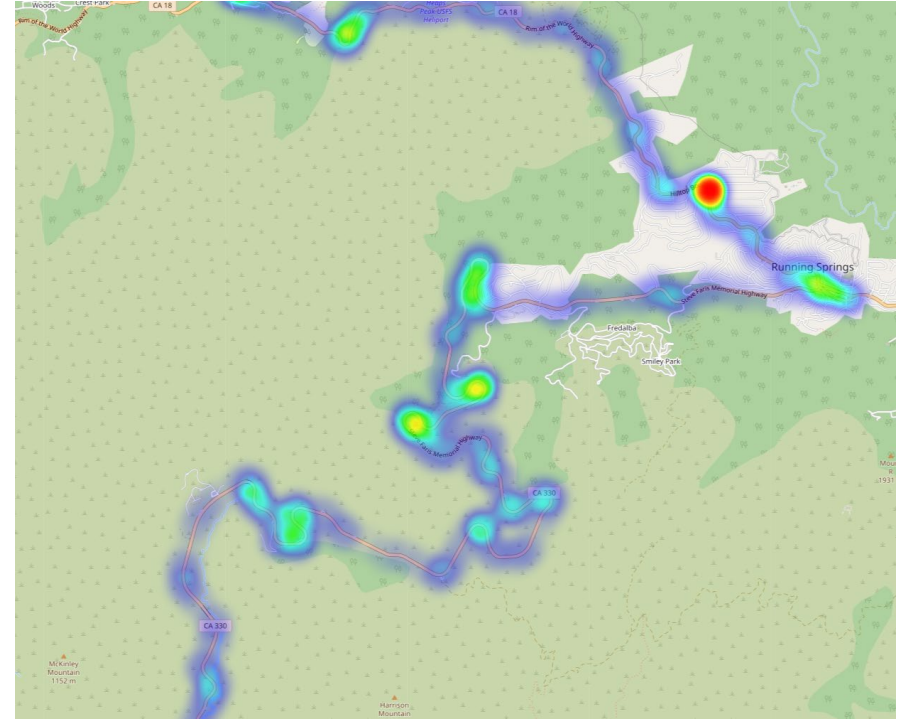
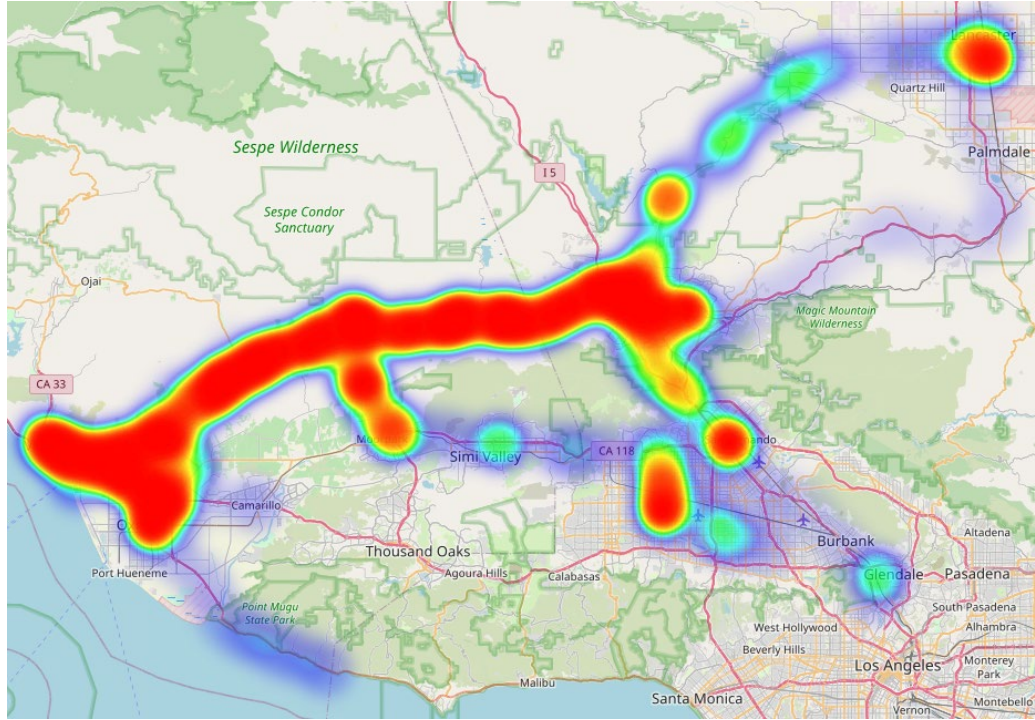
  

Range Limitation Summary	
Vehicle	Days Greater than 100 Miles
Vehicle 7	111
Vehicle 8	97
Vehicle 9	133
Vehicle 10	93
Vehicle 11	110
Vehicle 12	73

*Exemption Approved*

# Telematics Data for Operational Needs

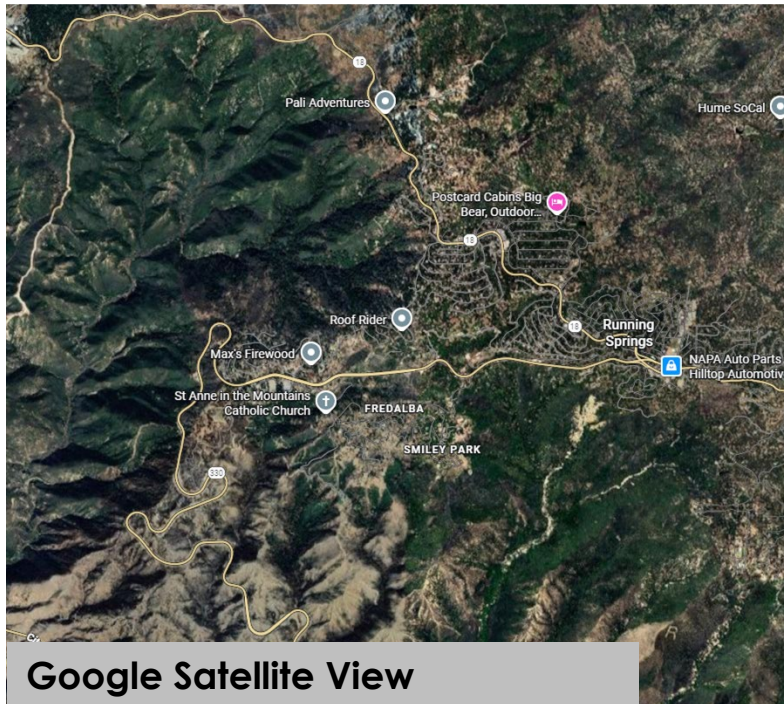
## Heat Maps for Understanding Usage.



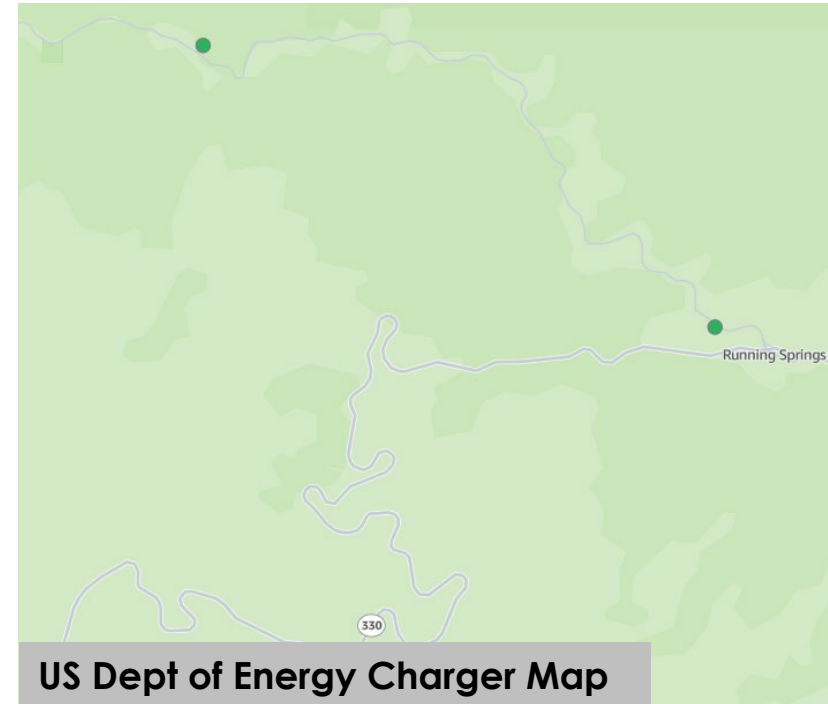
# Telematics Data for Operational Needs

## Heat Maps for ZEV Understanding Usage

### 4X4 Capability Needed



### Limited EVSE Infrastructure



# ZEV Transitions and Policy Compliance

Driving Change with Purpose

- Look at fleet wholistically.
  - Leverage redirections and swaps to open opportunities for ZEVs
- Support when data proves limitations.
  - When legitimate needs are taken seriously, it helps with buy-in.
- Balance compliance with operational needs.
  - Prioritize realistic transitions; let data justify exemptions

Questions?



Continuously Connected



# Agenda



Electric Vehicle  
Suitability  
Assessment



CARB CTC



BAR CTP



State of  
California  
Contract  
1-19-58-69  
updates



Next Meeting  
Topics

# Advancing sustainability goals is challenging



## Regulatory complexity

Navigating varying emissions rules, reporting requirements, and available incentives.



## Stakeholder expectations

Addressing customer and investor demands for verifiable data on carbon emissions.



## Disconnected data

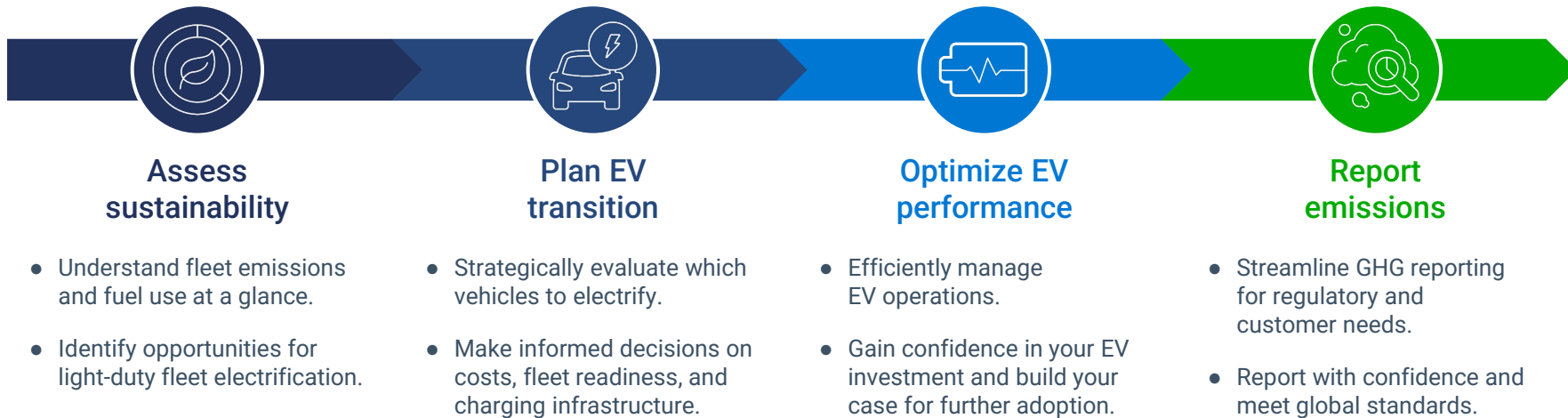
Missing a consolidated view from telematics, fuel and charging data.



## Difficulty guiding investments

Lacking clarity to prioritize investments for maximum impact.

# Achieve your sustainability goals with Geotab



**Operate a responsible, future-proof fleet.**

# Geotab is the best partner to help plan your fleet electrification journey



**G**

**Robust EV model support**



**1**

**Go electric with confidence**



**2**

**Optimize electric fleet operations**



**3**

**Charging integrations**

**No EVs**



**More EVs**

# Key data points to plan for electrification

## Financial

### Total cost of ownership and savings

Quantify the ROI of electrification by comparing lifetime TCO of EVs vs. ICE vehicles, factoring in fuel, electricity, maintenance, and procurement costs.

1

## Operational

### Operational feasibility and fit

Pinpoint best-fit EVs by analyzing real-world driving patterns, guaranteeing range assurance across seasonal changes, and estimating charging requirements to meet those needs.

2

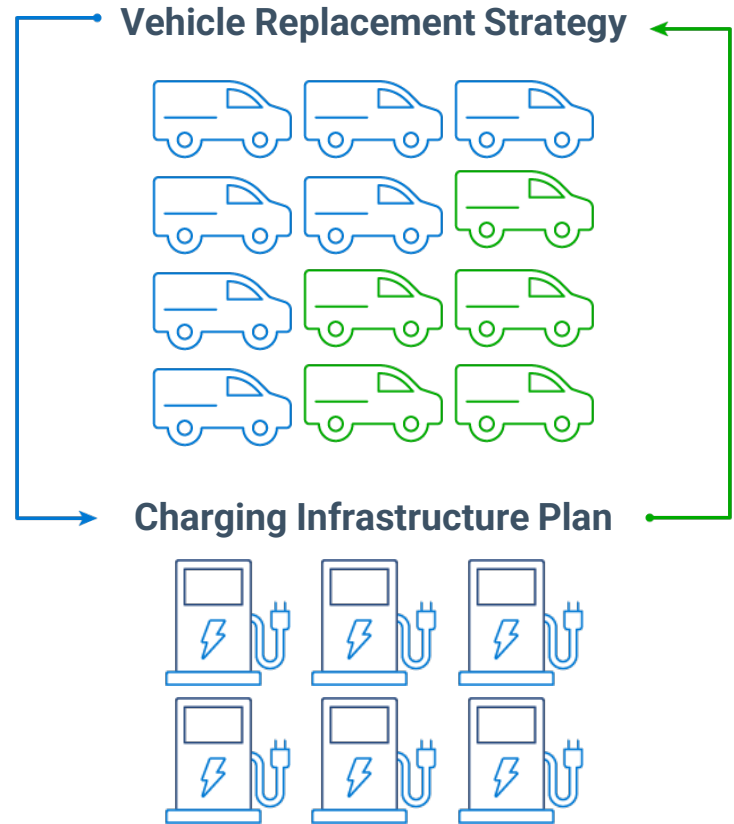
## Environmental

### GHG reduction and compliance

Project the direct impact of electrification by calculating the total reduction in tailpipe emissions to help achieve sustainability and disclosure goals.

3

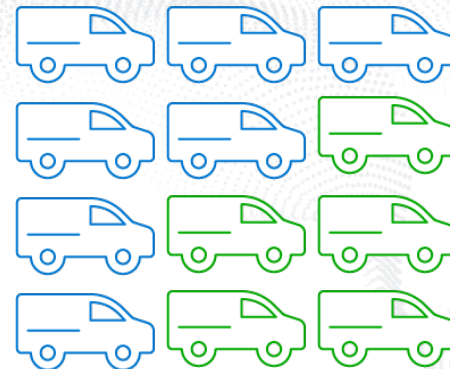
# Electrification Success Ingredients



# Vehicle Replacement Strategy

## How to prioritize which vehicles to replace by EVs?

- Range capability / On-route charging tolerance
- Procurement and operational expenses
- Tailpipe CO<sub>2</sub> reduction



### Range Capability Analysis

- Weather seasonality
- Driving speed
- Terrain topology
- Payload mass

### TCO Analysis

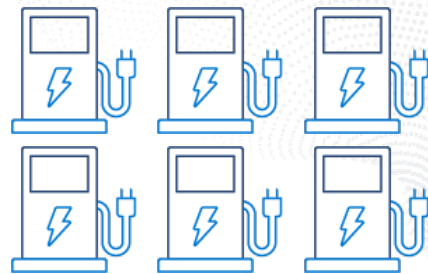
- Procurement
- Residual value
- Maintenance
- Fuel / Energy
- Incentives & Grants

### Multi-year Replacement Plan

- Vehicles end-of-life
- Annual budget constraints

# Charging Infrastructure Plan

- Where do I start with creating a charging plan?
- How do I prioritize sites?
- Should I create a home charging policy?



## Vehicle Charging Suitability

- Dwell time validation
- Dwell location conformity
- On-route charging needs
- Different charger speeds

## Site/Depot Assessment

- Vehicle congregation patterns
- Number of chargers
- Incremental power needs
- Electrical upgrades
- Load management / lower peak consumption

## Multi-year Replacement Plan

- EV growth projections
- Annual budget constraints
- Real estate considerations
- Physical site constraints
- Power constraints

# Home Charging Programs

Currently underutilized by most organizations

## PROs

- Reduce site power requirements
- Reduce overall costs
- Increase pool of capable EVs in fleet
- Employee perk

## CONs

- Insurance / Liability
- Build program policies:
  - Eligibility based on dwelling type
  - Employee relocation / departure
- Coordinate installations / support
- Manage charging cost reimbursement



# Collaboration within the organization

## Another important success ingredient

Different roles across the organization need to work together to ensure success



### Sustainability Manager

- Set emissions targets
- Craft decarbonization strategy
- Get organizational alignment
- Measure & track progress



### Fleet Manager

- Identify EV opportunities
- Manage introduction of EVs to fleet
- Ensure smooth EV operation



### Facilities Manager

- Understand power requirements
- Coordinate site upgrades
- Charger installation & upkeep



### Drivers

- Vehicle selection
- Range anxiety -> range awareness
- Access to charging
- New driving & charging habits
- Minimal job interruption

## PLAN

# Electric Vehicle Suitability Assessment (EVSA)

## Plan your roadmap



Identify electrification candidates using real-world data and charging information.



Save time researching EV replacements with local market best-fit model recommendations.



Assess EV viability based on charging availability and driver preferences.

## Build your case

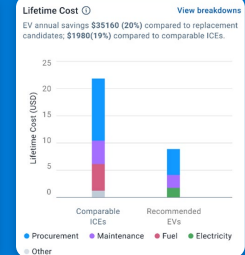
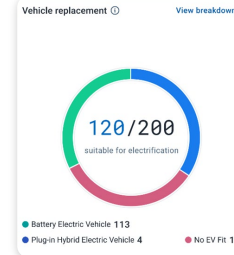


Get reliable financial forecasts and compare lifetime costs your current vehicles and potential EV replacements.



Estimate your potential fuel savings and CO2 emission reductions by simulating electrification scenarios.

EV model	EV type	Vehicle type	Vehicle size	Range	Cargo capacity
Vehicle Option 1 - Trim A	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 1 - Trim B	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 2 - Trim A	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 1 - Trim C	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 3 - Trim A	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 1 - Trim D	BEV	SUV	Mid-size	EPA 446 km	4,000 lbs
Vehicle Option 4 - Trim A	BEV	SUV	Mid-size	EPA 446 km	--
Vehicle Option 1 - Trim E	BEV	SUV	Mid-size	EPA 446 km	--
Vehicle Option 2 - Trim B	BEV	SUV	Mid-size	EPA 446 km	--
Vehicle Option 1 - Trim F	BEV	SUV	Mid-size	EPA 446 km	--
Vehicle Option 5 - Trim A	BEV	SUV	Mid-size	EPA 446 km	--



# Accurate EV range simulations

## Recommendations that work

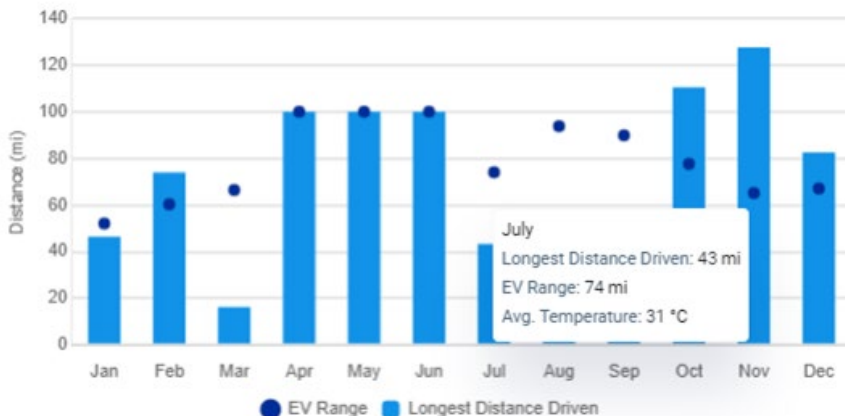
Using real world EV data to create energy efficiency models for our recommendation and suitability assessment engine.

## Benefits

- Account for the impact of **seasonal outside temperature** (and projected climate control usage), **trip speed** & air resistance, **trip distances** and durations
- Avoid recommendations of electric vehicles that won't meet fleet needs
- Increase **end user trust** and confidence in the recommendation

### Monthly Range Assurance

Based on the vehicle's current driving profile, the Mazda MX-30 would require on-route charging in 7 months of the year.



# Charging infrastructure planning insights (coming soon)

## Optimize capital investment:

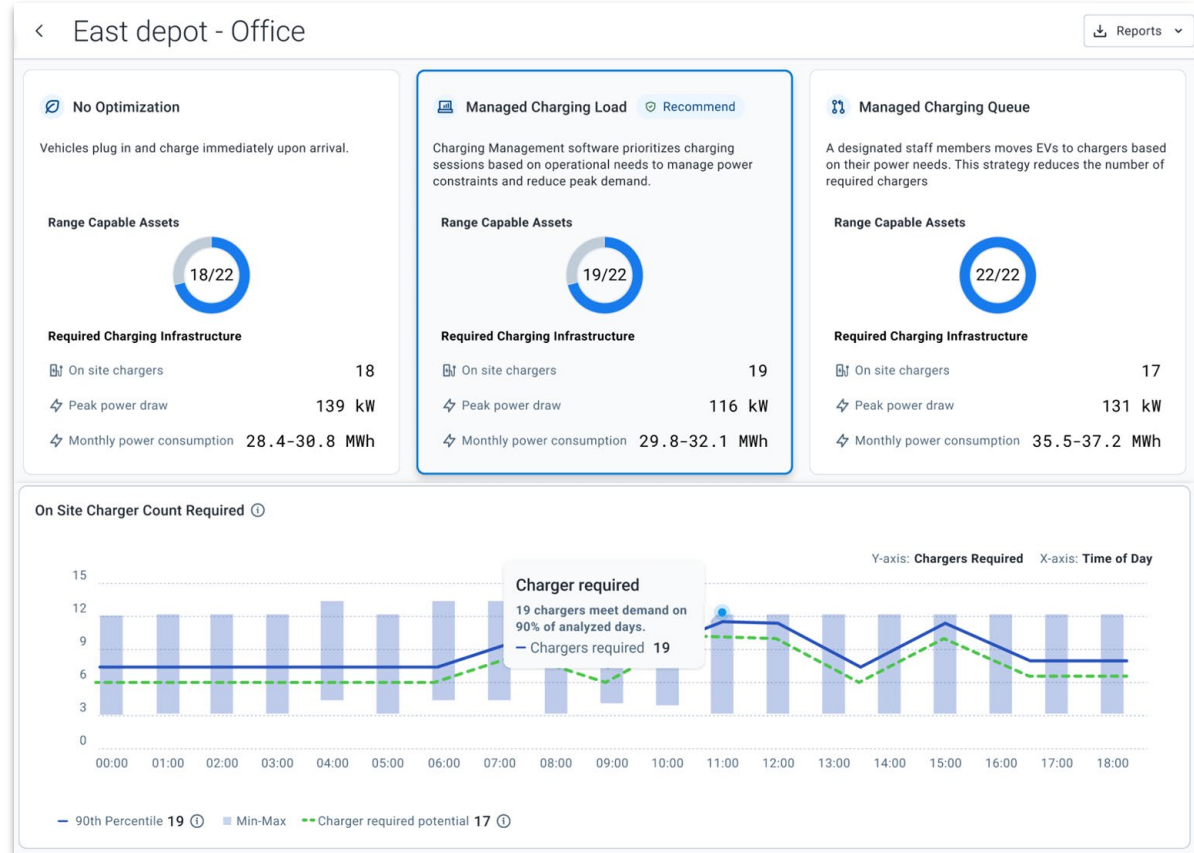
Accurately simulate operations to determine the optimal number of chargers based on driving and dwelling patterns

## Per-site Charging needs:

- Number of chargers
- Peak power load
- Monthly energy projection

## Compare multiple strategies:

- Charging management
- Queue management
- Home charging potential



## OPTIMIZE

# EV Charge Monitoring



See the live charging status and key metrics for all electric vehicles, including:

- Battery state of charge (%)
- Charging power
- Remaining range
- Location



Effectively manage a queue of vehicles waiting to charge, and predict vehicle charging completion and range to inform dispatch decisions.



Configure rules to identify and resolve charging exceptions and problems (including those missed by charging station software).

The screenshot displays the myGEOTAB EV Charge Monitoring interface. At the top, there are filters for 'EV Charging Rule' (1 Asset), 'Full Charge' (1 Asset), 'Low Charge' (2 Assets), 'Charging' (13 Assets), and 'Not Charging' (3 Assets). Below this is a table with the following columns: Asset, Charging status, EV charging ex..., State of charge, Charging pow..., Charge compl..., and Location.

Asset	Charging status	EV charging ex...	State of charge	Charging pow...	Charge compl...	Location
Vehicle 1 Vehicle, Battery Electric Vehicle	Charging	1	95%	1.0	Completing now	1567 W...
Vehicle 24 Vehicle, Battery Electric Vehicle	Not charging	0	80%	n/a	n/a	211 Oa...
Vehicle 6 Vehicle, Battery Electric Vehicle	Not charging	0	98%	n/a	n/a	3542 B...
Vehicle 7 Vehicle, Battery Electric Vehicle	Not charging	0	77%	n/a	n/a	211 Oa...
Vehicle 11 Vehicle, Battery Electric Vehicle	Not charging	0	80%	n/a	n/a	121 To...
Vehicle 76 Vehicle, Battery Electric Vehicle	Not charging	0	25%	n/a	n/a	23 Litt...

## OPTIMIZE

# EV Charging History



View and analyze the history of all charging events during a selected date period.



Identify patterns in EV charging history.



See per-session details for every EV:

- Charging zone
- Charge duration
- Charge start to finish
- Battery charge %
- Location
- Odometer reading



Understand where and when assets primarily charge and how much energy is added at each location.



Access the trip history related with the charge session.



Find cost-saving opportunities through charge optimization.

Zones	Charge Start to Finish	Charge Duration	Address	Battery Charge %	Electric Energy Added
Audi e-tron 55 Sportback (RB)					4080.3 kWh
Deutschland, Hansestadt Hamburg, Northern Hemispit	06/01/24 09:21:40 - 09:33:46	12m 6s	Ernst-Kabel-Stieg 5A, 22087 Hamburg, Germany	30% - 66%	29 kWh
Deutschland, Hansestadt Hamburg, Northern Hemispit	06/03/24 15:04:44 - 15:19:09	14m 25s	Ernst-Kabel-Stieg 5A, 22087 Hamburg, Germany	42% - 80%	31.8 kWh
Deutschland, Hansestadt Hamburg, Northern Hemispit	06/16/24 07:36:30 - 08:52:20	55m 49s	Hamburg Arpt (HAM), P4 Terminal, Flughafenstr. ...	43% - 47%	3.1 kWh
Deutschland, Hansestadt Hamburg, Northern Hemispit	06/17/24 15:07:50 - 15:23:23	15m 33s	Julius-Brecht-StraÙe 6, 22609 Hamburg, Germany	25% - 71%	37.1 kWh
Deutschland, Hansestadt Hamburg, Northern Hemispit	06/23/24 13:45:58 - 14:03:49	17m 50s	Ernst-Kabel-Stieg 5A, 22087 Hamburg, Germany	30% - 80%	41.2 kWh
Deutschland, Northern Hemisphere, Schleswig-Holstei	06/25/24 07:54:45 - 08:05:02	10m 17s	RWWP+CF, Auf dem Berge 1, 24568 Kaltenkirche...	53% - 79%	22.8 kWh

## OPTIMIZE

# EV Performance

### Gain confidence in your EV investment



View real-time and seasonal variation in range capability across all makes and models.



Monitor your useable battery capacity and battery state of health to understand degradation.

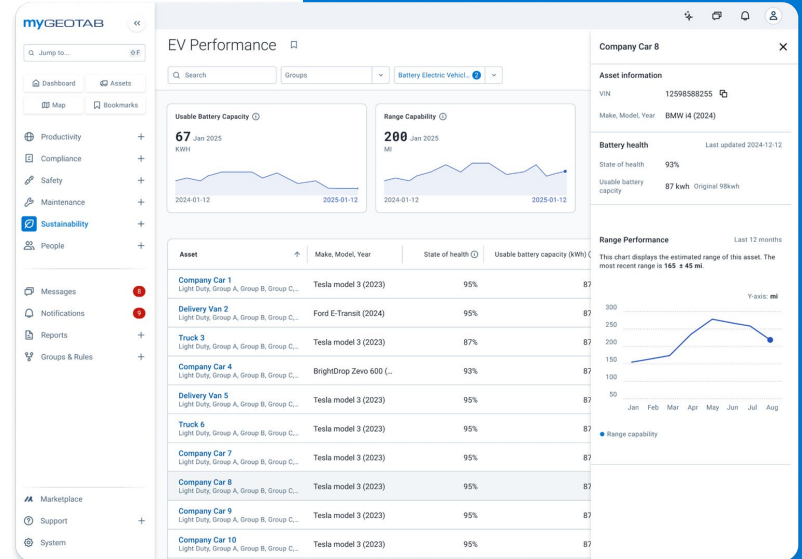
### Build your case for further adoption



Understand battery degradation impact on service life and total cost of ownership.



Identify and confirm EVs that can actually drive your routes.



## OPTIMIZE

# Asset Utilization

(coming soon)

Optimize your entire fleet operation

### Right-size your fleet

Identify underutilized assets that can be removed from the fleet without impacting operations.

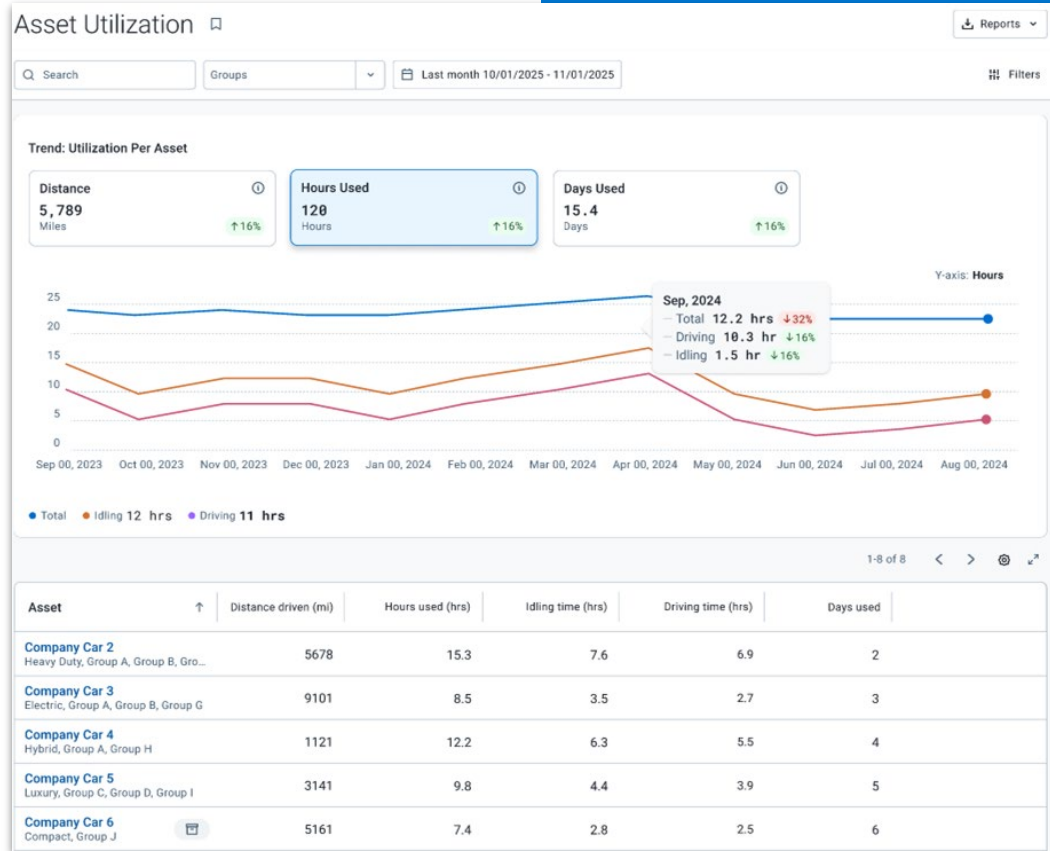
### Get more from your existing assets

Plan to pool assets or move them to other departments where they can get more use.





Rotate assets between high use departments and low use departments to balance wear and tear, extend service life.

### Data-backed lifecycle management

Head into annual budget / procurement cycles with a data-backed plan for which vehicles to retire, which vehicles to keep, and which departments **truly need** additional vehicles to be procured.



# CARB Clean Truck Check (CTC)

-  CTC - formerly known as the Heavy Duty Inspection and Maintenance (HD I/M) program.
-  Diesel and alternative trucks over 14k lbs
-  Geotab device will remotely monitor vehicles.
-  Hard cost savings to customers



**CLEAN**  
**TRUCK CHECK**

# CARB Order



Geotab has a compliant aftermarket telematics solution in California!



Uninterrupted telematics data



*(c) No person shall install, sell, offer for sale, or advertise any device, apparatus, or mechanism intended for use with, or as a part of, any required motor vehicle pollution control device or system **which alters or modifies the original design or performance** of any such motor vehicle pollution control device or system.*

**California Code, Vehicle Code - VEH § 27156**



EXECUTIVE ORDER D-876

Relating to Exemptions Under Section 27156  
of the California Vehicle Code

Geotab, Inc.  
GO Kit  
Sub-models: GO Kit, GP Kit, and GR Kit

# BAR Continuous Testing Program (CTP)



Only available for gov't agencies.



Geotab sends data to BAR eliminating the need for smog tests.



Hard cost savings

DEPARTMENT OF CONSUMER AFFAIRS

**BAR**  
Bureau of Automotive Repair

# State of California Contract 1-19-58-69



## Benefits & Purpose

- Improve Vehicle Utilization
- Fleet Electrification
- Reduction in GHG Emissions
- Regulatory Reporting
- Reduce Operating Costs
- FMIS Integration
- No contract obligation

## Contract Package - \$19.75/mo.

- Geotab Telematics GO Device - \$0
- Harness - \$0
- De-Installation of Current Telematics Hardware - \$0
- Installation of Geotab GO Device - \$0
- Monthly Recurring Fee
  - Pro-Plus Plan
- \$18.50 Self Install Option



# Next Meeting Topics



## **Deep dive on new utilization feature**

Explore the latest features for optimizing fleet usage and efficiency.



## **Video Telematics for General Services**

Leveraging video data for safety and operational insights in public sector fleets



## **Altitude powered by Geotab**

Advanced mobility insights and analytics platform helping guide transportation planning and infrastructure development

## Corporate headquarters

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Australia



FLEET SERVICES DIVISION

# ***Ronald Wirth***

*Fleet Advance Planning and Sustainability Manager  
County of Sacramento, Fleet Services Division*

# FLEET SERVICES DIVISION OVERVIEW

- Area of Operation – 994 square miles
- Population of over 1.6 million
- Who We Serve –
  - Sacramento County Residents, Visitors, Businesses
  - 24 Separate County Departments including –
  - Sheriff's Department
  - Coroner
  - District Attorney
  - Animal Control and Regulation
  - Department of Transportation
  - Department of Water Resources
  - Department of Child, Family and Adult Services
  - Department of Waste Management and Recycling
  - Office of Emergency Services



# SACRAMENTO DELTA



SACRAMENTO  
COUNTY

# FLEET SERVICES STATISTICS

- Over 2,800 fleet units, 73% Light, 22% Medium and Heavy, 5% Off Road
- Approximately 460 Department Owned vehicles maintained by Fleet Services
- Annual Fuel Usage – over 3.4M Gallons (all fuels)
- Over 22 million miles traveled (VMT) in 2024
- 7 Maintenance Facilities
- 97 Total Fleet Employees
- 73 Technicians
- ASE Blue Seal Certified
- Fleet Services Division Chief
- Light Equipment Fleet Manager
- Heavy Equipment Fleet Manager
- Fleet Advance Planning and Sustainability Manager
- Specifications and Procurement Supervisor

# RENEWABLE FUELS AND ADVANCED TECHNOLOGY

- Entire Refuse Fleet, 153 Trucks, running on Renewable Natural Gas (RNG).
- Department of Transportation, 13 Trucks, running on Renewable Natural Gas (RNG).
- Nearly 1.4 M Gasoline Gallon Equivalent (GGE) of RNG consumption in 2024.
- Remaining Diesels (290 On and Off Road) running on Renewable Diesel (R99).
- Over 675K Gallons of R99 consumption in 2024.
- 736 Light Duty Hybrids – Including in Law Enforcement Service.
- 4 Hydrogen Fuel Cell
- 64% of 2024 Fuel Consumption was Renewable Fuels or Hybrid/Plug In/Fuel Cell  
(59.7% Renewable if Hybrid Fuel Consumption is not included.)
- 49+% Greenhouse Gas (GHG) reduction by using Renewable, Alternative and Electric VS. equivalent consumption of petroleum fuels.

# SUSTAINABILITY MEASURES

- 1999 – Heavy Duty Low Emission Vehicle Acquisition Policy
- 2001 – Refuse converted first group of refuse trucks to LNG. County constructed LNG station.
- 2012 – First EV Chargers at Branch Center and Downtown. Nearly 100 L2 and 4 DCFC by year end 2025.
- 2015 - The County opened the first combination time/fast fill CNG station in the region
- 2015 – GPS Pilot in 200 vehicles resulted in 12.9% reduction in fuel usage in the test group and eliminating 3 underutilized units.
- 2016 – First Renewable Diesel Pilot
- 2017 – Conversion from CNG to RNG.
- 2021 – SMUD Efuel Advisor Study and Report
- 2024 – Completed GPS / Telematics in all powered vehicles
- 2025 – Broke Ground on charging identified in SMUD Efuel Advisor Report

# COUNTY INITIATIVES AND REGULATORY COMPLIANCE

- 2011 - Board of Supervisors adopted the Sacramento County Climate Action Plan (CAP) Strategy and Framework Document (Phase 1) to meet GHG reductions required by California's Global Warming Solutions Act of 2006
- 2020 – County Board of Supervisors Climate Emergency Declaration
- 2020 – Executive Order N-79-20 signed by Governor Newsom
- 2022 – County Climate Action Plan Phase 2B
- 2024 – California Air Resources Board – Advanced Clean Fleets Regulation



# EMISSIONS REGULATION SUMMARY

- CARB – Advanced Clean Fleets – Vehicles over 8,500 GVWR + LD delivery.
- CARB – Clean Truck Check – Vehicles over 14,000 GVWR - all fuels other than gasoline.  
(2) times per year. In 4/2027 increases to (4) times per year.
- Smog Check Program – All Gasoline units. Proposed change from 8 years to 7 years old.
- LSI – **Proposed** zero emission. Example: Forklifts, Scrubbers, Yard Tugs.
- Off Road – 25HP+. New emission testing and new Tier 5 standards for 2031.
- PERP – 50HP+. Tier 3 Phase out. No proposed changes currently.

GOVERNMENT  
GREEN FLEETS

County of  
**SACRAMENTO**  
CALIFORNIA



RANKED #1  
IN NORTH AMERICA

**2018**

# 2018 #1 GREEN FLEET!

BY 100 BEST FLEETS - GREEN FLEET AWARDS



#11 Green Fleet in 2023

#10 Green Fleet in 2024

#9 Green Fleet in 2025



# EVERY FLEET IS UNIQUE !

- There is no “One Size Fits All” solution.
- Assess Your Fleet - Size, Make Up, Geography, Climate, Parking Locations, Operational Challenges and Unique Operations
- Talk to your vehicle / equipment operators. Review equipment needs with them. Visit job sites.



# COUNTY CREWS AND EQUIPMENT IN ACTION



# MAXIMIZE THE BENEFITS OF YOUR DATA

- The Basics – Safety, PM Currency, PM Quality, Utilization, Unit Availability, Breakdown Rate, Technician Productivity and Efficiency, Accurate Data and Reporting.
- Transportation Policy and Collective Bargaining -
  - Are your policies and agreements up to date?
- KPI and Benchmarking – You cannot improve what you cannot measure!
- Customer Communication and Surveys –
  - Are your priorities aligned with those of your customers?
- Asset Management – Vehicle / Equipment Replacement Forecasting
  - Don't wait for the perfect solution while operating inefficient / costly vehicles.
- Collaboration and Communication – City Council, Board of Supervisors, Facilities Management, Real Estate Management, Budget / Accounting, Purchasing, Power Utility
- Understand your organization's Environmental / Sustainability Policies and Goals

# GPS / TELEMATICS BENEFITS

- GPS / Telematics is the most efficient method to achieve data collection and reporting.
- Nearly all smog checks are satisfied without removing vehicles from service.
- Clean Truck Check Program – Must use approved GPS provider. ECM and GPS cannot be disabled anytime during test period.
- Advanced Clean Fleet – Exemption approval will require detailed daily data using telematics.
- Off Road emission testing requirements are expected from CARB soon.
- Additional Benefits:
  - Safety – Speed monitoring, seat belt notification, driver behavior.
  - Vehicle Data in Real time – Utilization Data, Odometer Readings, Engine Hour Readings, Emission Fault Notifications, Diagnostics Trouble Codes.
  - Efficiency – Smog Checks, Automatic Work Requests, avoids breakdowns and reduces down time.
  - Asset Management – Lifecycle Forecasting

# GPS / TELEMATICS IN MUNICIPAL FLEETS

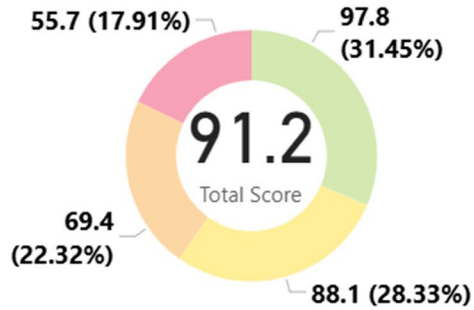
- Conduct Pilots to identify the system and supplier that works best for your application.
- Identify Approval Levels - City Council, Board of Supervisors, Director
- Transportation Policy
- Bargaining Unit Notification / Meetings
- Consult Purchasing – Identify Means to Purchase. State Contract, Co-Op Contract, Internal RFP. **Include installation and extended subscription period.**
- Verify IT Systems and Fleet Management Information System (FMIS) Compatibility.
- Set benchmarks for the parameters that are most valuable to your fleet. Safety, Fuel Consumption, Unauthorized Use, Routing, etc.

# GEOTAB TELEMATICS / POWER BI DASHBOARD

## DEPARTMENT DRIVER SAFETY SCORECARD

Reset Filters

Total Score by Scoring Classification Ranking



Scoring Classification Ranking

- Low Risk
- Mild Risk
- Medium Risk
- High Risk

FLEET VEHICLE COUNT

**2632**

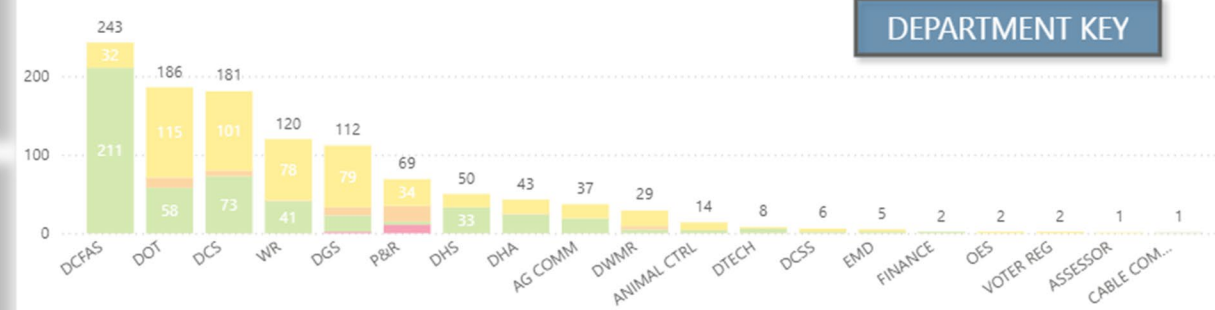
Count of UNIT NO

GPS INSTALLED

**1219**

Count of UNIT NO

Scoring Classification Ranking ● High Risk ● Low Risk ● Medium Risk ● Mild Risk



Department Safety Scorecard

Vehicle Safety Scorecard

Safety Benchmark

Incidents

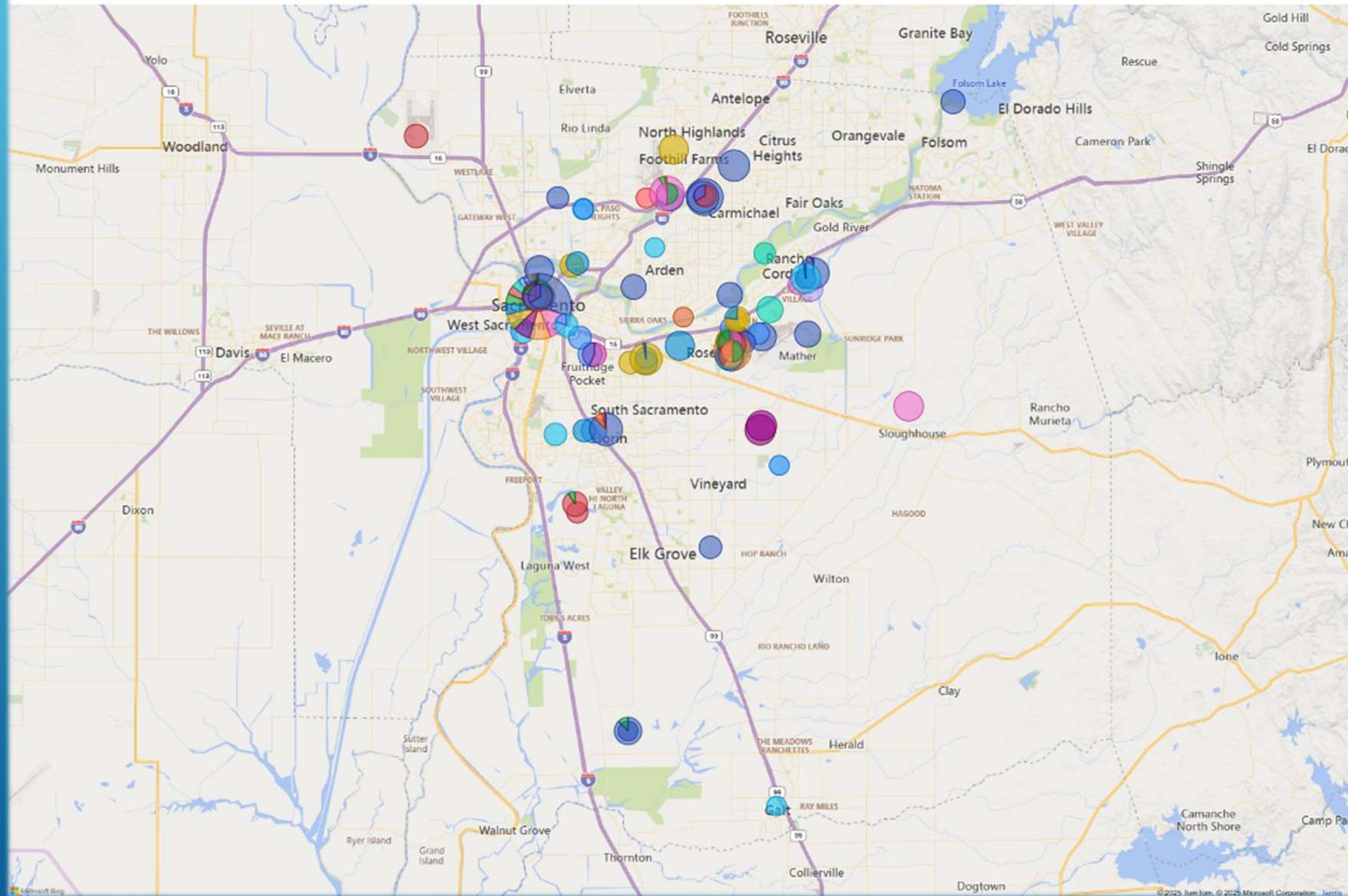
DEPT NAME	FLEET#	GEOTAB#	Distance (mi)	Total Score	Scoring Classification	Harsh Acceleration	Harsh Braking	Harsh Cornering	No Seat Belt 6+ mph	Speeding	Total Trips	Speeding 10+ mph over posted speed limit.	Excessive Speed over 90 MPH Count	No Seat Belt 6+ mph	Harsh Acceleration	Harsh Braking	Harsh Cornering
AG COMM	40	19	47335	97.4	Low Risk	93.7	99.5	91.2	96.0	98.7	1665	209	0	750	17	17	367
AG COMM	40	18	43550	89.2	Mild Risk	79.5	96.8	77.3	70.0	99.2	8400	146	0	6033	72	123	801
ANIMAL CTRL	17	4	33885	96.4	Low Risk	95.9	99.8	96.6	89.2	96.5	1426	136	0	995	40	4	132
ANIMAL CTRL	17	10	73212	87.6	Mild Risk	77.7	99.3	89.6	59.1	95.5	20843	656	0	17455	197	44	714
ASSESSOR	1	1	2172	92.7	Mild Risk	77.0	99.1	83.9	84.4	99.0	200	8	0	105	50	2	35
CABLE COMMISSION	1	1	1381	96.6	Low Risk	84.8	100.0	84.8	98.5	99.9	50	1	0	7	21	0	21
DCFAS	247	211	923647	97.8	Low Risk	94.8	98.6	92.2	97.9	98.2	21760	5286	0	4324	20	1133	6701
DCFAS	247	32	81845	93.2	Mild Risk	78.7	98.3	75.3	92.1	97.5	6562	638	0	1971	57	132	2004
DCS	200	73	346895	97.7	Low Risk	93.8	99.4	90.9	97.8	98.7	9711	1170	0	3111	30	161	3091
DCS	200	7	52324	71.2	Medium Risk	45.0	98.8	38.4	21.1	93.7	26662	584	0	19465	456	57	3362
DCS	200	101	518976	88.0	Mild Risk	76.8	99.1	78.6	67.2	95.6	102869	5162	0	75653	124	322	9236
DCSS	6	2	7931	96.4	Low Risk	95.8	98.2	89.7	90.9	99.3	364	22	0	213	17	14	82
DCSS	6	4	17040	92.7	Mild Risk	89.3	97.1	65.3	88.9	98.5	1482	63	0	543	37	33	697
DGS	128	2	3204	56.9	High Risk	0.0	99.6	0.0	0.0	84.7	3867	102	0	2621	286	2	571
DGS	128	21	58019	97.4	Low Risk	93.0	99.1	92.4	95.8	99.2	1708	96	0	727	20	36	424
DGS	128	10	18383	69.9	Medium Risk	53.1	96.0	45.8	5.5	96.6	14484	101	0	12130	128	32	946
DGS	128	79	212642	88.2	Mild Risk	84.1	99.2	83.5	62.4	95.3	48078	930	3	40816	38	126	3085
DHA	74	24	59594	98.0	Low Risk	96.1	98.9	93.9	98.7	96.9	1408	421	0	171	14	66	419
DHA	74	1	2554	67.1	Medium Risk	20.5	98.8	68.7	67.2	24.2	710	133	0	291	203	3	80
DHA	74	18	51241	91.6	Mild Risk	79.8	96.9	92.6	80.1	93.1	5962	377	0	4525	35	38	386



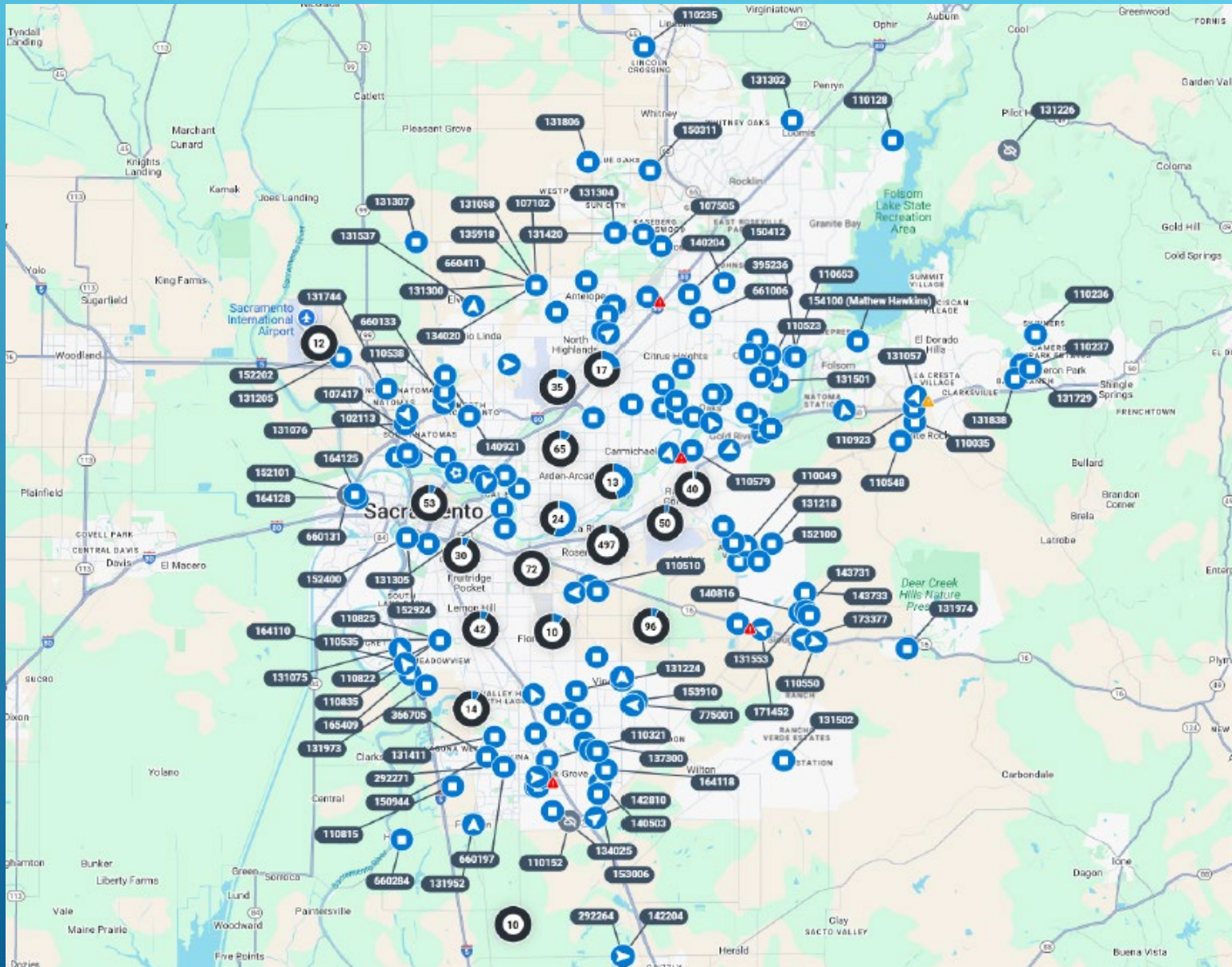
# PARKING LOCATION MAP

UNIT COUNT by PARKING LOCATION FULL and DEPT NAME

DEPT NAME ● AG COMM ● ANIMAL CTRL ● ASSESSOR ● CABLE COMMISSION ● CORONER ● DA ● DCFAS ● DCS ● DCSS ● DGS ● DHA ● DHS ● DOT ● DTECH ● DWMR ● EMD ● FINANCE ● OES ● P&R ● PD ● PROB ● SSD ● VOTER REG ● WR



# CURRENT LOCATION MAP



# TRIP DATA ANALYSIS

- Telematics data using simple export to Excel
- Average daily and maximum daily distances for one year.
- Eliminates perceptions about daily miles driven.
- Customize to distinct groups of vehicles where EV replacements are proposed.
- Set Report Parameters to match the expected range of the proposed electric vehicle.
- Expected range should account for varying conditions and battery degradation over time.
- Identifies parking locations and dwell times to plan for charging.

## TRIP SUMMARY DATA

Unit No	Days	Greater than 110	Max Daily Dist.	Avg Daily Dist.	% Under 110 miles
134408	69	3	127.31	51.63	96%
134409	91	8	150.30	54.47	91%
134410	106	5	135.08	60.00	95%
134411	86	4	137.17	46.90	95%
134412	105	3	122.72	41.32	97%
134413	58	2	143.07	55.25	97%
134414	143	6	151.62	49.41	96%
134415	102	7	143.48	47.80	93%
134416	164	9	184.15	54.75	95%
134417	152	19	208.92	58.94	88%

# INTERNAL REPORTS USING POWER BI

- Data Sources:
  - Fleet Management Information System (FMIS)
  - GPS / Telematics
  - Fuel Transactions
  - Microsoft Applications: Access, SharePoint, Excel
- Leverage data from multiple sources to produce custom reports:
  - Safety Scorecard
  - Unit Data
  - Utilization
  - Vehicle Miles Traveled (VMT)
  - Vehicle Replacement Forecasting
  - Accident / Vandalism Reports
  - Parking Location
  - Product / Fuel Reports
  - Parts inventory
- All above reporting is highly customizable by: Department, Vehicle Type, Fuel Type, Weight Class, etc.
- Indispensable data when planning for electric vehicle charging infrastructure.

# FLEET VEHICLE REPLACEMENT FORECASTING

- Facilitates Regular and Scheduled Replacement of Fleet Vehicles on a pre-determined life cycle.
- Long Term Budget Planning.
- Maintains Average Fleet Age – Current Avg. Age – **5.1 years.**
- Minimizes Maintenance and Operating Costs.
- Customizable for Specific Vehicle Classes.
- Allows for infrastructure planning.
- Use of these management tools has been beneficial in largely eliminating overdue replacement vehicles which will allow a strategic transition to Zero Emission and EV to meet sustainability goals and regulations.

# LONG TERM REPLACEMENT FORECAST

## REPLACEMENT MODEL PLANNING



**2383**

UNIT COUNT

**5.07**

Average of AGE

**61**

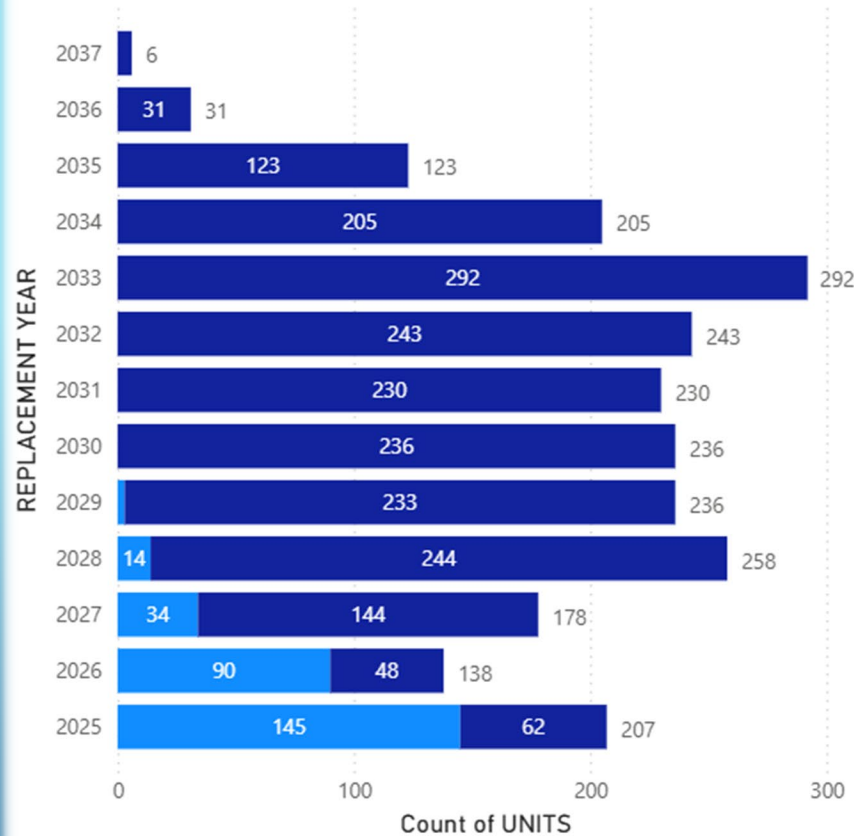
Average of MONTHS IN SERVICE

**7.93%**

INFLATION FACT

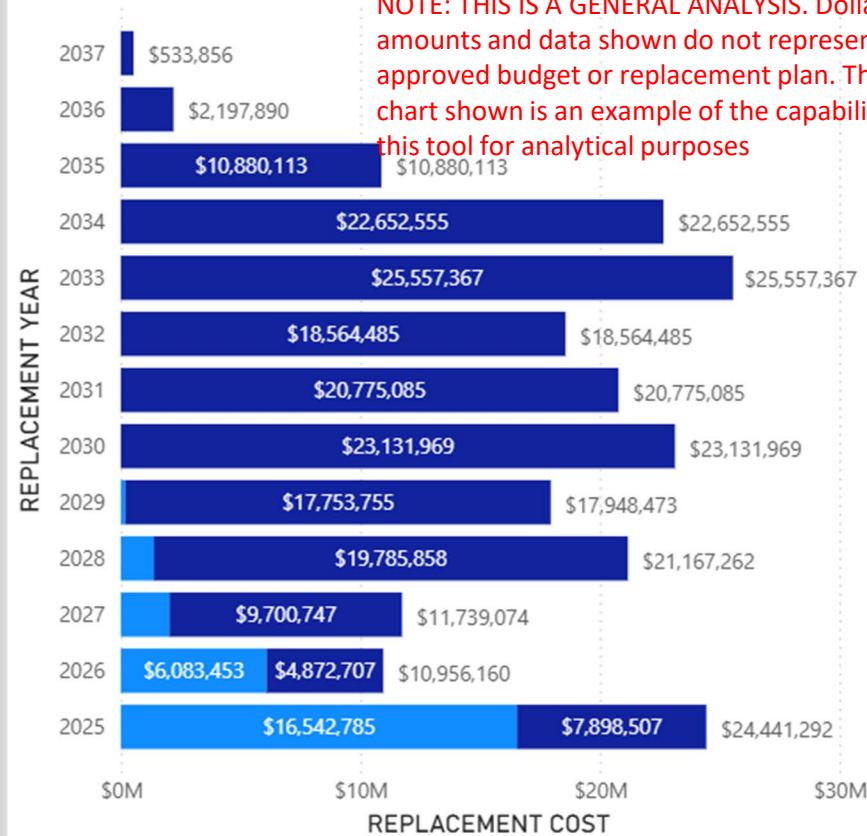
REPLACEMENT COUNT by REPLACEMENT YEAR

BUDGET CHECK ● BUDGETED ● NOT ON REPLACEMENT LIST



REPLACEMENT COST by REPLACEMENT YEAR

BUDGET CHECK ● BUDGETED ● NOT ON REPLACEMENT LIST



NOTE: THIS IS A GENERAL ANALYSIS. Dollar amounts and data shown do not represent an approved budget or replacement plan. The chart shown is an example of the capabilities of this tool for analytical purposes

UNIT CLASS	Average of AGE
101	4.67
102	4.58
107	3.78
110	5.33
118	12.00
122	3.63
124	5.01
126	5.69
131	4.67
132	6.61
134	6.59
135	5.55
137	4.77
140	4.62
141	4.18
142	4.41
150	4.18
151	4.11
152	4.66
153	5.12
154	4.57
156	14.00
157	7.50
158	7.82
159	5.00
160	7.83
161	7.33
162	12.50
163	8.00
164	7.36
<b>Total</b>	<b>5.07</b>

# LONG TERM REPLACEMENT FORECAST

**2403**  
Count of UNIT NO

**FLEET TYPE 2**

 HEAVY  
 LIGHT  
 LIGHT-SSD

**OWNED\_TYPE**

 DEPT OWNED  
 RENTAL

**STATUS\_DESC**

 Active unit  
 Flagged for disposal

**UNIT\_CLASS**

 Select all  
 101  
 102  
 107  
 110  
 118  
 122  
 124  
 126  
 131  
 132  
 134  
 135

**USING DEPT**

 Select all  
 AG COMM  
 ANIMAL CTRL  
 ASSESSOR  
 CABLE COMMISSION  
 CORONER  
 DA  
 DCFAS  
 DCS  
 DCSS  
 DGS  
 DHA  
 DHS  
 DOT

**CLASS\_TYPE**

 Select all  
 Automobile  
 Buses, Highway and Metro Transport  
 Buses, School Transportation  
 Engines, Pumps and Compressors  
 Excavating, Grading, Compacting, Paving and Loading Equip.  
 Farm Tractor, Implements, Industrial Tractor and Lifts

**BUDGETED**

263

**NOT ON REPLACEMENT LIST**

2140

**PURCHASE COST**

\$0 \$1,500,000

**GWWR**

750 140000

**REPLACE DATE CHECK**

 GOOD  
 REPLACE BY DATE

**REPLACE BY MILES**

 GOOD  
 REPLACE BY MILE

**REPLACEMENT YE...**

 2025  
 2026  
 2027  
 2028  
 2029  
 2030  
 2031  
 2032

**REPLACEMENT ..**

7/1/1994

11/8/2038

**Search UNIT\_NO**

101001 101002

101003 101004

101304 101305

101306 101307

**BUDGET CHECK**

 BUDGETED  
 NOT ON REPLACEMENT LIST

**REPLACEMENT YEAR CHECK**

 DATE  
 NOW  
 USAGE

**LIFE CYCLE METER**

0 200000

REPLACEMENT DETAIL																						
STATUS_DESC	UNIT_NO	YEAR	MAKE	MODEL	USING_DEPT	IN_SERV_DT	MONTHS_IN_SERVICE	REPLACEMENT_DATE	LIFE_CYCLE_AGE	EXPECT_USAGE	METER	LASTYR_USAGE	YTD_USAGE	LTD_MONTHLY_USAGE_AVG	REPLACEMENT_COST_NOW	REPLACEMENT_COST_at_RepDate	REPLACEMENT_COST_SWITCH	REP_DT_OVER/UN DER	REP_USAGE_OVER/UN DER	REPLACEMENT_DATE_BY_USAGE	REPLACI	
Flagged for disposal	107506	2016	CHEVROLET	COLORADO	DOT	3/24/2016	116	3/24/2028	12	120000	106059	11058	3759	914	\$38,692	\$42,765	\$41,788	2	13941	11/25/2026	11/25/2026	
Active unit	107509	2025	TOYOTA	TACOMA	AG COMM	4/11/2025	7	4/11/2035	10	100000	6007	1839	4159	858	\$33,761	\$58,061	\$58,069	9	93993	11/25/2034	11/25/2026	
Active unit	107510	2024	FORD	MAVERICK	DHS	12/9/2024	11	12/9/2036	12	120000	903	506	424	82	\$31,393	\$57,326	\$57,326	10	119097	11/25/2037	12/9/2024	
Active unit	107511	2024	FORD	MAVERICK	EMD	4/29/2025	7	4/29/2037	12	120000	3945	973	3117	564	\$27,699	\$51,869	\$54,290	11	116055	11/25/2037	4/29/2025	
Active unit	107512	2025	TOYOTA	TACOMA	DCS	9/29/2025	2	9/29/2035	10	100000	2966	1	3279	1483	\$36,644	\$65,092	\$51,302	9	97034	11/25/2030	11/25/2026	
Active unit	107700	2017	CHEVROLET	COLORADO	AG COMM	3/14/2017	104	3/14/2029	12	120000	49966	2817	2070	480	\$40,962	\$47,412	\$47,412	3	70034	11/25/2037	3/14/2017	
Active unit	107701	2017	CHEVROLET	COLORADO	AG COMM	3/17/2017	104	3/17/2029	12	120000	70697	6578	3926	680	\$40,962	\$47,412	\$47,412	3	49303	11/25/2031	3/17/2017	
Active unit	107702	2017	CHEVROLET	COLORADO	AG COMM	3/15/2017	104	3/15/2029	12	120000	54089	4060	2667	520	\$40,962	\$47,412	\$47,412	3	65911	11/25/2036	3/15/2017	
Active unit	107703	2017	CHEVROLET	COLORADO	AG COMM	3/15/2017	104	3/15/2029	12	120000	70840	3333	2047	681	\$40,962	\$47,412	\$47,412	3	49160	11/25/2031	3/15/2017	
Active unit	107706	2017	CHEVROLET	COLORADO	DOT	11/1/2017	96	11/1/2029	12	120000	64947	8887	2735	677	\$38,852	\$46,432	\$46,432	3	55053	11/25/2032	11/1/2017	
Active unit	107800	2018	CHEVROLET	COLORADO	P&R	6/18/2018	89	6/18/2030	12	120000	59575	8046	4064	669	\$39,116	\$48,118	\$48,118	4	60425	11/25/2033	6/18/2018	
Active unit	107801	2018	CHEVROLET	COLORADO	P&R	5/24/2018	90	5/24/2030	12	120000	49040	4911	1967	545	\$39,280	\$48,118	\$48,118	4	70960	11/25/2036	5/24/2018	
Active unit	107809	2019	CHEVROLET	COLORADO	AG COMM	8/29/2018	87	8/29/2030	12	120000	64737	12534	5569	744	\$37,776	\$46,861	\$46,861	4	55263	11/25/2031	8/29/2018	
Active unit	107810	2018	CHEVROLET	COLORADO	DOT	8/9/2018	87	8/9/2030	12	120000	45750	7086	2367	526	\$37,776	\$46,861	\$46,861	4	74250	11/25/2037	8/9/2018	
Active unit	107913	2019	CHEVROLET	COLORADO	DGS	10/25/2019	73	10/25/2031	12	120000	11233	1931	1047	154	\$40,182	\$52,975	\$52,975	5	108767	11/25/2037	10/25/2019	
Active unit	107914	2019	CHEVROLET	COLORADO	AG COMM	8/12/2019	75	8/12/2031	12	120000	46756	8242	5050	623	\$36,325	\$47,465	\$47,465	5	73244	11/25/2035	8/12/2019	
Active unit	107916	2019	CHEVROLET	COLORADO	DOT	10/24/2019	73	10/24/2031	12	120000	44638	6024	2100	611	\$38,415	\$50,645	\$50,645	5	75362	11/25/2035	10/24/2019	
<b>Total</b>							<b>148145</b>					<b>41075553</b>	<b>1817474</b>	<b>1796661</b>	<b>\$164,370,982</b>	<b>\$218,902,269</b>	<b>\$214,211,030</b>					

REPLACEMENT DETAIL																			
STATUS_DESC	USING_DEPT_NO.	DEPT_NAME	USING_DEPT_DESC.	UNIT_CLASS	UNIT_NO	YEAR	MAKE	MODEL	CATEGORY_DESC	METER	MONTHS_IN_SERVICE	LIFE_CYCLE_METER	LASTYR_USAGE	YTD_USAGE	LTD_MONTHLY_USAGE_AVG	PROJECTED_USAGE_YEARS	EXP_LIFE_USAGE_YEAR_SWITCH	LIFE_CYCLE_AGE	REPLACI DATE
Flagged for disposal	BU7478-D	SSD	SSD-RCPD ADMIN 7407478000	101	101503	2015	BMW	R1200RT-P	MTRCL-LEMRKED-PM	59403	124	100000	2401	942	479	7	7.06	10	7/1/21
Flagged for disposal	BU2613-D	DOT	DOT-TRAFFIC OPER 2962613100	102	102318	2013	TOYOTA	PRIUS C	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	60632	147	120000	5419	2780	412	12	12.00	12	8/21/21
Active unit	BU720234-D	DHS	DHS-CONSR 7202900340	102	102324	2013	TOYOTA	PRIUS C	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	44813	147	120000	1373	635	305	21	12.00	12	8/15/21
Flagged for disposal	BU720234-D	DHS	DHS-CONSR 7202900340	102	102327	2013	TOYOTA	PRIUS C	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	50757	147	120000	1586	679	345	17	12.00	12	8/15/21
Active unit	BU2611-D	DOT	DOT-PLANNING 2962611100	102	102328	2013	TOYOTA	PRIUS C	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	40009	147	120000	1215	461	272	25	12.00	12	8/15/21
Flagged for disposal	BU6422-D	P&R	P&R-RANGERS 6401100220	107	107205	2022	FORD	MAVERICK	TRK, PU, 1/4 TON, CREW CAB, HYBRID	108943	42	120000	32843	15862	2594	0	0.36	12	5/26/21
Flagged for disposal	BU215193-D	DCS	DCS-CMID LAB 2152193100	107	107922	2019	CHEVROLET	COLORADO	P/U TRK-1/4T-XCABGUSE-NRML PM	127076	74	120000	25397	11957	1717	0	-0.34	12	9/5/21
Flagged for disposal	BU780100-D	DCFAS	DCFAS-ALLOCATED COSTS 7801000100	110	110157	2021	TOYOTA	PRIUS	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	114010	57	120000	22063	6314	2000	0	0.25	12	2/10/21
Active unit	BU57231-D	DCS	DCS-CODE ENF 5725723100	110	110248	2013	TOYOTA	PRIUS	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	49077	144	120000	4781	620	341	17	12.00	12	11/14/21
Flagged for disposal	BU780100-D	DCFAS	DCFAS-ALLOCATED COSTS 7801000100	110	110304	2013	TOYOTA	PRIUS	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	53435	146	120000	2239	933	366	15	12.00	12	9/5/21
Active unit	BU780100-D	DCFAS	DCFAS-ALLOCATED COSTS 7801000100	110	110316	2013	TOYOTA	PRIUS	CAR-CMPT-4DR, HYBRD, GUSE-NRML PM	45697	146	120000	1398	480	313	20	12.00	12	9/5/21

NOTE: THIS IS A GENERAL ANALYSIS. Dollar amounts and data shown do not represent an approved budget or replacement plan. The chart shown is an example of the capabilities of this tool for analytical purposes.

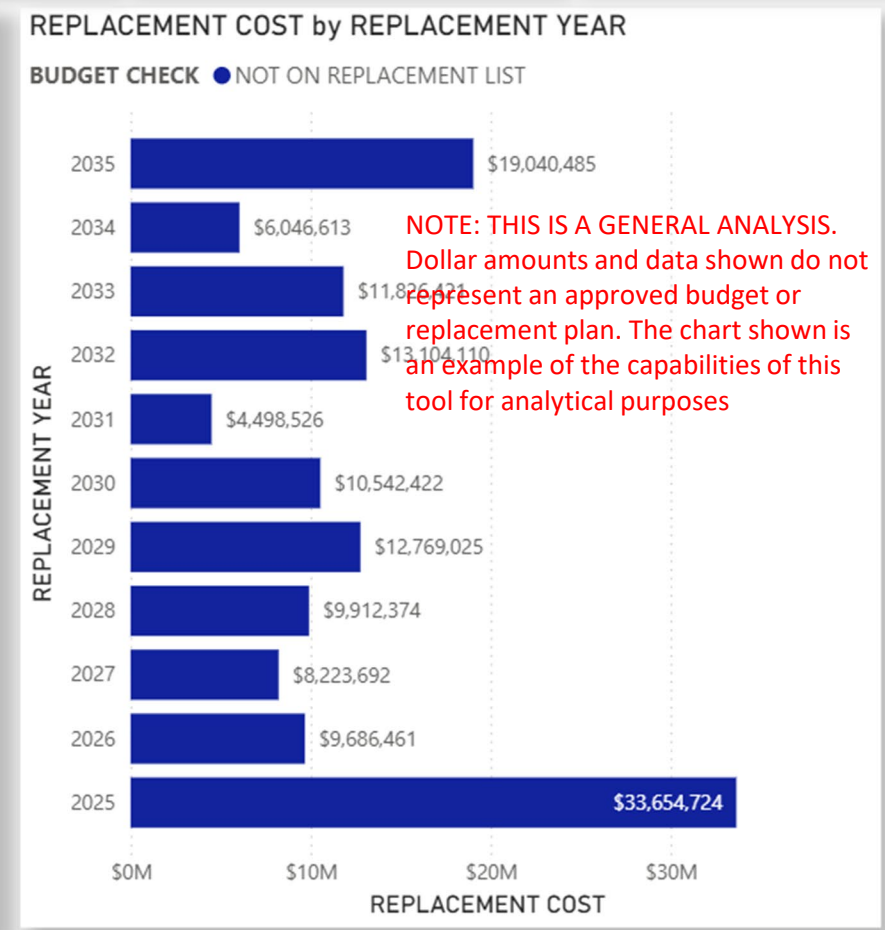
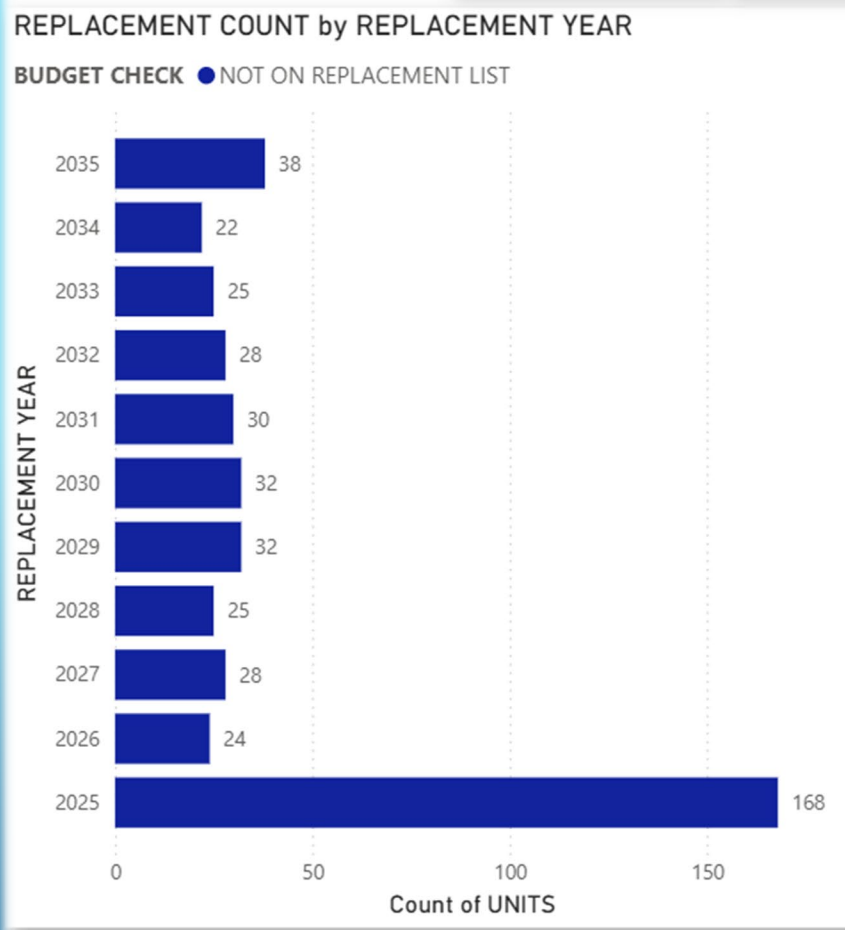
# DEPARTMENT OWNED REPLACEMENT FORECAST

## REPLACEMENT MODEL PLANNING



<b>452</b> UNIT COUNT	<b>9.47</b> Average of AGE	<b>104</b> Average of MONTHS IN SERVICE	<b>8.00%</b> INFLATION FACT
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UNIT CLASS	Average of AGE
143	5.33
169	16.00
187	7.40
193	7.00
201	3.83
20T	7.67
236	20.00
237	18.50
239	5.61
364	19.00
383	0.33
384	9.00
393	8.00
400	10.25
660	14.70
661	6.30
701	10.33
702	6.27
704	5.83
706	9.60
707	4.00
768	2.67
769	7.00
787	3.57
888	5.38
891	3.00
893	7.00
SSI	8.00
<b>Total</b>	<b>9.47</b>

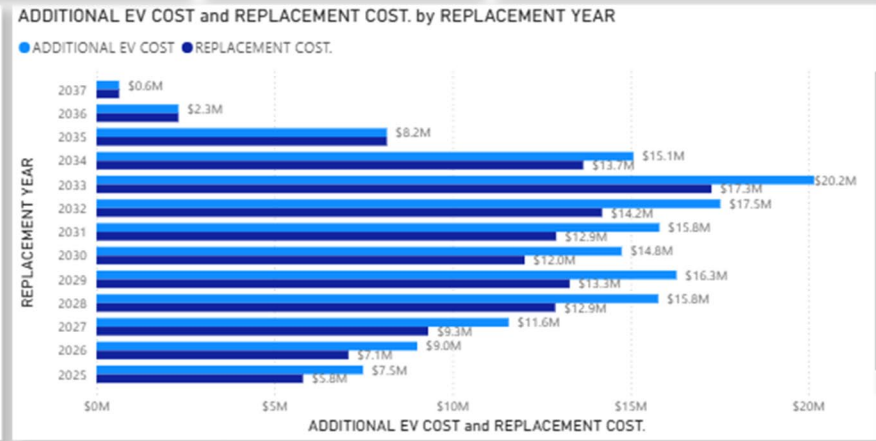


**NOTE: THIS IS A GENERAL ANALYSIS.**  
Dollar amounts and data shown do not represent an approved budget or replacement plan. The chart shown is an example of the capabilities of this tool for analytical purposes

# EV TRANSITION FORECAST – LIGHT EQUIPMENT

<b>2029</b> Unit Count	<b>7.93%</b> Avg INFLATION RATE	<b>30%</b> Average of VAR_EV_MARKUP	<b>\$130M</b> REPLACEMENT COST	<b>\$25M</b> Sum of ADDITIONAL EV COST	<b>\$155M</b> Sum of EV ESTIMATED COST + INFLATION COST
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REPLACEMENT YEAR	Count of UNIT NO	Sum of EV ESTIMATED COST + INFLATION COST	Sum of REPLACEMENT COST
2037	7	\$635,884	\$635,884
2036	32	\$2,300,719	\$2,300,719
2035	107	\$8,157,111	\$8,157,111
2034	183	\$15,082,880	\$13,673,404
2033	256	\$20,157,027	\$17,275,995
2032	233	\$17,523,459	\$14,202,514
2031	192	\$15,811,651	\$12,913,056
2030	196	\$14,753,412	\$12,028,495
2029	208	\$16,292,980	\$13,291,416
2028	209	\$15,779,331	\$12,887,282
2027	166	\$11,579,075	\$9,316,694
2026	122	\$9,009,272	\$7,077,033
2025	114	\$7,488,434	\$5,800,939
2024	4	\$360,202	\$360,202
<b>Total</b>	<b>2029</b>	<b>\$154,931,437</b>	<b>\$129,920,743</b>



**NOTE: THIS IS A GENERAL ANALYSIS.** Dollar amounts and data shown do not represent an approved budget or replacement plan. The chart shown is an example of the capabilities of this tool for analytical purposes

CLASS TYPE	Count of UNIT NO	EV EST MARKUP	Sum of REPLACEMENT COST	Sum of EV ESTIMATED COST + INFLATION COST
Motorcycles, Scooters and ATV	4		\$138,132	\$138,132
Trucks, Street Sanitation/Sewer Cleaning	1	30%	\$230,159	\$299,207
Motorcycles, Scooters and ATV	5	30%	\$262,398	\$341,117
Vans	96		\$7,061,270	\$7,061,270
Automobile	152		\$8,428,171	\$8,428,171
Vans	152	30%	\$8,831,074	\$11,480,397
Pick Up Trucks	376		\$30,924,190	\$30,924,190
Automobile	609	30%	\$29,116,274	\$37,851,156
Pick Up Trucks	634	30%	\$44,929,075	\$58,407,797
<b>Total</b>	<b>2029</b>		<b>\$129,920,743</b>	<b>\$154,931,437</b>

DEPT NAME	Count of UNIT NO	Sum of EV ESTIMATED COST + INFLATION COST	Sum of REPLACEMENT COST
AG COMM	36	\$2,648,364	\$2,155,582
ANIMAL CTRL	14	\$2,897,875	\$2,390,388
ASSESSOR	1	\$55,595	\$42,765
CABLE COMMISSION	1	\$72,126	\$55,482
CORONER	5	\$300,515	\$268,976
DA	80	\$4,842,075	\$4,007,170
DCFAS	235	\$14,153,950	\$11,619,378
DCS	199	\$13,269,051	\$11,007,552
DCSS	3	\$182,816	\$140,628
DGS	109	\$9,733,467	\$8,036,540
DHA	69	\$4,427,115	\$3,627,546
DHS	46	\$2,989,615	\$2,566,532
DOT	111	\$14,685,772	\$12,104,866
DTECH	10	\$646,953	\$532,624
DWMR	24	\$1,602,172	\$1,380,800
<b>Total</b>	<b>2029</b>	<b>\$154,931,437</b>	<b>\$129,920,743</b>

ASSIGNED LIGHT EQUIP  
2029  
Count of UNIT NO

1091	140000
Min of GVWR	Max of GVWR
OWNED TYPE	Count of UNIT NO
RENTAL	2029
<b>Total</b>	<b>2029</b>

NOTES:

# FORECASTING ELECTRIC VEHICLE COST

## BY VEHICLE TYPE – LIGHT EQUIPMENT

### Passenger Cars and Light Pickups

- Passenger cars and trucks are being manufactured currently. Availability has been limited for fleet type vehicles.
- Retail, Wholesale, CoOp Contracts, State Contract pricing is known.
- Estimates and Assumptions can be made based on current models, manufacturer pricing, and accounting for inflation.
- Manufacturer's are discontinuing many fleet trim levels for more profitable higher trim levels.



# EV GROWTH PLAN - EXAMPLE

## VEHICLE REPLACEMENT FORECAST

NOTE: The analysis below is a forecast of vehicle replacements according to a set lifecycle. It is not an approved plan, and is subject to change based on many factors. Vehicle replacement budgets are approved yearly. A ten (or more) year forecast cannot guarantee those vehicles will be replaced as indicated.

YEAR	Vehicle Type	Quantity	Average VMT	Total VMT in Class	Average Miles per Kw	KiloWatts	Total Average Kw per Year	246	1.20	Year to Year Accumulation Kw per Day	Year to Year Vehicle Accumulation	Future Outlook and Recommendations	Level 2 Chargers	DC Fast Chargers	Electrical Capacity by Hardware Rating (Rough Estimate)
								Average Kw Demand per Work Day (246)	Peak Kw Demand per Work Day (Adds Factor shown)						
2025	Passenger Sedan	5	5,158	25,790	3.4	7,585	17,640	71.71	86.05	86.05	7	Recommend (4) if there is existing electrical capacity. If increasing capacity, plan for expansion.	4	1	160 amps @ 208VAC 3 Ph. for (4) Level 2, 50 amps @ 480VAC 3 Ph. for (1) Level 3 (DCFC)
	Pickup Truck	2	10,557	21,114	2.1	10,054									
2026	Passenger Sedan	2	5,158	10,316	3.4	3,034	13,088	53.20	63.85	149.89	11		4	1	
	Pickup Truck	2	10,557	21,114	2.1	10,054									
2027	Passenger Sedan	2	5,158	10,316	3.4	3,034	103,577	421.04	505.25	655.15	33	This may be a good starting point.	10	2	400 amps @ 208VAC 3 Ph. for (10) Level 2, 100 amps @ 480VAC 3 Ph. for (2) Level 3 (DCFC)
	Pickup Truck	20	10,557	211,140	2.1	100,543									
2028	Passenger Sedan	6	5,158	30,948	3.4	9,102	49,319	200.49	240.58	895.73	47	Start budgeting and planning for 2030/2031.	16	4	640 amps @ 208VAC 3 Ph. for (16) Level 2, 200 amps @ 480VAC 3 Ph. for (4) Level 3 (DCFC)
	Pickup Truck	8	10,557	84,456	2.1	40,217									
2029	Passenger Sedan	2	5,158	10,316	3.4	3,034	133,740	543.66	652.39	1548.12	75		24	6	960 amps @ 208VAC 3 Ph. for (24) Level 2, 300 amps @ 480VAC 3 Ph. for (6) Level 3 (DCFC)
	Pickup Truck	26	10,557	274,482	2.1	130,706									
2030	Passenger Sedan	3	5,158	15,474	3.4	4,551	90,013	365.90	439.09	1987.20	95	Due to increase in 2031 to 122 units, installing chargers in advance of the increase likely will be needed which effectively increases the 2030 target.	30	6	1,200 amps @ 208VAC 3 Ph. for (30) Level 2, 300 amps @ 480VAC 3 Ph. for (6) Level 3 (DCFC)
	Pickup Truck	17	10,557	179,469	2.1	85,461									
2031	Passenger Sedan	4	5,158	20,632	3.4	6,068	121,693	494.69	593.62	2580.83	122	Start budgeting and planning for 2032.	40	8	1,600 amps @ 208VAC 3 Ph. for (40) Level 2, 400 amps @ 480VAC 3 Ph. for (8) Level 3 (DCFC)
	Pickup Truck	23	10,557	242,811	2.1	115,624									
2032	Passenger Sedan	8	5,158	41,264	3.4	12,136	92,571	376.30	451.56	3032.39	146		50	8	2,000 amps @ 208VAC 3 Ph. for (50) Level 2, 400 amps @ 480VAC 3 Ph. for (8) Level 3 (DCFC)
	Pickup Truck	16	10,557	168,912	2.1	80,434									
2033	Passenger Sedan	7	5,158	36,106	3.4	10,619	70,945	288.39	346.07	3378.46	165	Start budgeting and planning for 2035.	55	8	2,200 amps @ 208VAC 3 Ph. for (55) Level 2, 400 amps @ 480VAC 3 Ph. for (8) Level 3 (DCFC)
	Pickup Truck	12	10,557	126,684	2.1	60,326									
2034	Passenger Sedan	4	5,158	20,632	3.4	6,068	111,638	453.81	544.58	3923.04	190		60	8	2,400 amps @ 208VAC 3 Ph. for (60) Level 2, 400 amps @ 480VAC 3 Ph. for (8) Level 3 (DCFC)
	Pickup Truck	21	10,557	221,697	2.1	105,570									
2035	Passenger Sedan	4	5,158	20,632	3.4	6,068	46,285	188.15	225.78	4148.82	202		65	10	2,600 amps @ 208VAC 3 Ph. for (65) Level 2, 500 amps @ 480VAC 3 Ph. for (10) Level 3 (DCFC)
	Pickup Truck	8	10,557	84,456	2.1	40,217									

Vehicles Per Charger Factor - Generally - (3) vehicles to one Level 2 charger - rounded to the nearest even number

NOTE: All circuit recommendations shown are based on simple multiplication of single charger requirements multiplied by the number of recommended charging ports. These are worst case estimations only and are not based on engineered circuits. In reality, most chargers have charge management software to manage rate of charge and optimize the available electrical capacity. There are complete systems available to manage electrical loads based on demand, number of vehicles that need to charge, and when they need to achieve full charge. A qualified electrical engineer, specializing in EV charging infrastructure, likely could design systems requiring much less capacity than indicated on this sheet.

NOTE: THIS IS A GENERAL ANALYSIS. Data shown does not represent an approved vehicle replacement plan. Actual implementation is likely to differ from the analysis shown.

# EV TRANSITION FORECAST – HEAVY EQUIPMENT

117

Unit Count

8.00%

Avg INFLATION RATE

80%

Average of VAR\_EV\_MARKUP

\$43M

REPLACEMENT COST

\$23M

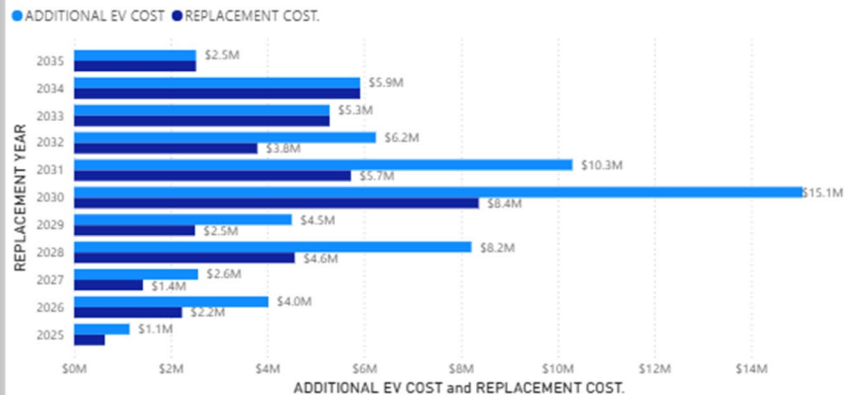
Sum of ADDITIONAL EV COST

\$66M

Sum of EV ESTIMATED COST + INFLATION COST

REPLACEMENT YEAR	Count of UNIT NO	Sum of EV ESTIMATED COST + INFLATION COST	Sum of REPLACEMENT COST
2035	7	\$2,521,524	\$2,521,524
2034	11	\$5,914,548	\$5,914,548
2033	11	\$5,283,411	\$5,283,411
2032	12	\$6,241,126	\$3,790,044
2031	18	\$10,303,300	\$5,724,055
2030	25	\$15,061,420	\$8,367,456
2029	9	\$4,502,432	\$2,501,351
2028	12	\$8,214,799	\$4,563,777
2027	4	\$2,564,057	\$1,424,476
2026	6	\$4,019,183	\$2,232,880
2025	2	\$1,149,184	\$638,435
<b>Total</b>	<b>117</b>	<b>\$65,774,984</b>	<b>\$42,961,957</b>

ADDITIONAL EV COST and REPLACEMENT COST. by REPLACEMENT YEAR



CLASS TYPE	Count of UNIT NO	EV EST MARKUP	Sum of REPLACEMENT COST	Sum of EV ESTIMATED COST + INFLATION COST
Trucks, Special Mobile Services	1		\$432,813	\$432,813
Trucks, Street Sanitation/Sewer Cleaning	6		\$4,277,178	\$4,277,178
Trucks, General Purpose	13		\$4,284,369	\$4,284,369
Trucks, Excavation	7	80%	\$2,660,144	\$4,788,259
Trucks, Pavement Maintenance	11		\$5,451,314	\$5,451,314
Trucks, Pavement Maintenance	8	80%	\$3,975,382	\$7,155,687
Trucks, Special Mobile Services	15	80%	\$4,906,777	\$8,832,198
Trucks, Street Sanitation/Sewer Cleaning	11	80%	\$5,420,033	\$9,756,060
Trucks, General Purpose	45	80%	\$11,553,947	\$20,797,105
<b>Total</b>	<b>117</b>		<b>\$42,961,957</b>	<b>\$65,774,984</b>

DEPT NAME	Count of UNIT NO	Sum of EV ESTIMATED COST + INFLATION COST	Sum of REPLACEMENT COST
AG COMM	1	\$659,616	\$366,453
DGS	8	\$3,892,471	\$2,162,484
DOT	63	\$36,954,808	\$24,411,675
FLEET	1	\$428,700	\$428,700
P&R	1	\$141,618	\$141,618
SSD	5	\$1,761,480	\$1,315,296
WR	38	\$21,936,290	\$14,135,731
<b>Total</b>	<b>117</b>	<b>\$65,774,984</b>	<b>\$42,961,957</b>

ASSIGNED HEAVY EQUIP

117  
Count of UNIT NO

14500  
Min of GVWR

66000  
Max of GVWR

NOTES:

OWNED TYPE	Count of UNIT NO
RENTAL	117
<b>Total</b>	<b>117</b>

NOTE: THIS IS A GENERAL ANALYSIS. Dollar amounts and data shown do not represent an approved budget or replacement plan. The chart shown is an example of the capabilities of this tool for analytical purposes

# FORECASTING ELECTRIC VEHICLE COST

## BY VEHICLE TYPE – HEAVY EQUIPMENT

### Heavy Duty Trucks

- Currently suitable EV truck chassis are not available to build most County medium and heavy municipal service trucks. Available configurations do not allow for service body installations.
- Weight of electric chassis are much heavier. Batteries / Components occupy frame space.
- Most heavy manufacturers are not at scaled production for vocational trucks.
- Many aftermarket and EV startups - one or more may fill the void but cost is currently unknown.
- Fleet cost assumptions are based on models for which manufacturers have advertised retail pricing.
- County heavy municipal trucks require major upfit. Cost increase is not a straight percentage increase.
- Regulatory compliance strategies often involve a change in vehicle class, or a purchase of an EV in a lighter vehicle class to offset a purchase of an ICE heavy truck that cannot yet be electrified.



# ELECTRIC VOCATIONAL TRUCK COST ESTIMATING

## Example:

County of Sacramento heavy service truck.  
Total cost in this example was 40% chassis and 60% body and upfit.

Total cost of truck shown in 2018 -  
**\$222,735**

Estimate for diesel replacement in 2028 –  
**\$400,923**



## Estimate to Convert to EV:

Chassis Cost 40% =	\$160,370	<b>X 300% (Convert to EV)</b>	=	\$481,108
Body and Upfit 60% =	\$240,554	Equivalent Body and Upfit	=	<u>\$240,554</u>
			=	<b>\$721,662</b>

Net Increase in this example is 80.0%

# USE OF GRANTS AND INCENTIVES

## ➤ Assess Grant / Incentive Requirements

Does it meet your use case?

Are there restrictions? Fleet vs Public use? Regulatory Restrictions?

Can you meet the timelines?

Long Term Obligations – Data Collection and Reporting?

Do you have the resources (hardware, software, personnel) to meet requirements?

Does the benefit outweigh the costs of complying with grant requirements?

Who will draft the grant application?

Can you make a competitive business case compared to other applicants?

## ➤ Pre-Planned and /or Permitted Projects are an Advantage

A “Shovel Ready” project is a huge advantage in meeting grant / incentive application deadlines.



# HOW DO YOU MAKE SENSE OF IT ALL?



- Data, Data, Data!
- Process improvement
- Internal Reporting
- Fleet Performance Measures and KPIs
- Understand your Fleet and Your Customers - Communication
- Identify “Low Hanging Fruit”
  - Where is the most fuel consumed?
  - What alternatives are available?
  - The cleanest gallon of fuel is the gallon that is never consumed!
- Third Party Consulting
  - Fleet Analysis and EV Transition Implementation Plan
  - Facility Assessment, Energy Modeling, Retrofit, Charging Infrastructure Plan
  - Grant Writer

# ***Ronald Wirth***

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