

Regional Working Group – 1st Meeting



Municipal Fleet Electrification Study for the City of Fremont

January 16th, 2020

Meeting Purpose

1. Share progress on Fremont's fleet electrification analysis & methodologies
2. Collect input from regional stakeholders on the design & analytical scope of the Vehicle Electrification Assessment Tool



Agenda & Housekeeping

- Welcome, Project Background & Project Overview (9:30a – 9:40a)
- Phase 1 Progress & Next Steps (9:40a -10:35a)
- Break-out Group Activity Intro (10:35a - 10:45a)
- 10-minute Break
- Vehicle Electrification Tool Design Activity (10:55a – 11:55a)

Special thanks to East Bay Clean Cities for providing refreshments



PROJECT BACKGROUND

- Funded through the Bay Area Air Quality Management District Climate Protection Grant program
- Purpose: To help the City of Fremont think strategically about ways to achieve robust decarbonization, share conclusions and best practices with the region
- Supports Air District goals of reducing air pollution and the impacts of climate change



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

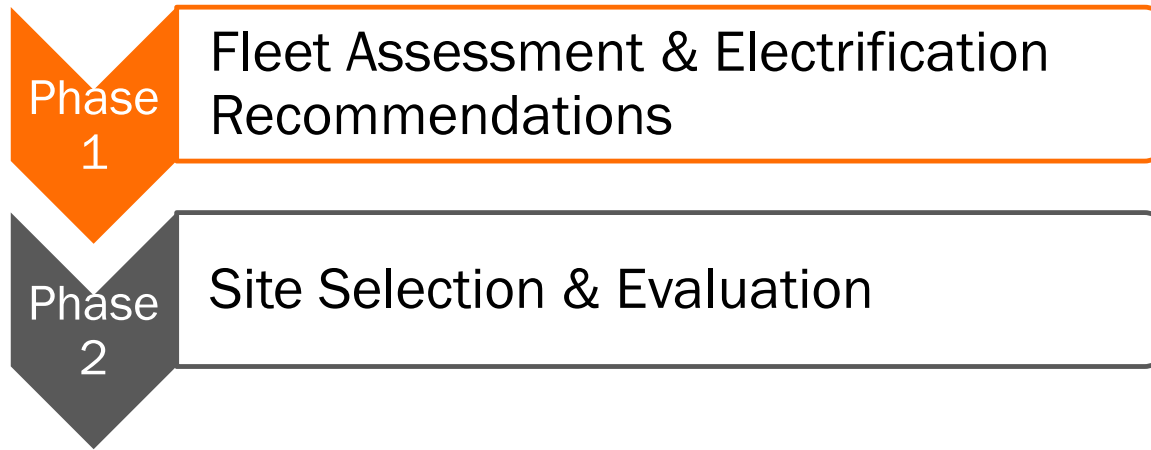
PROJECT OVERVIEW

Phase
1

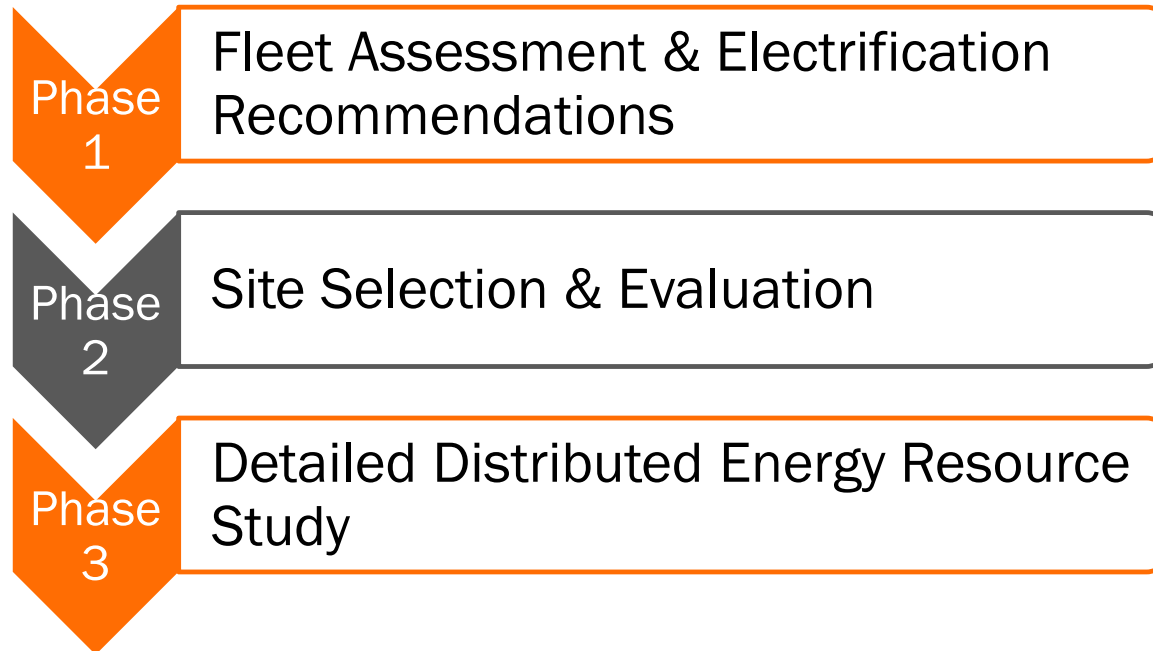
Fleet Assessment & Electrification
Recommendations



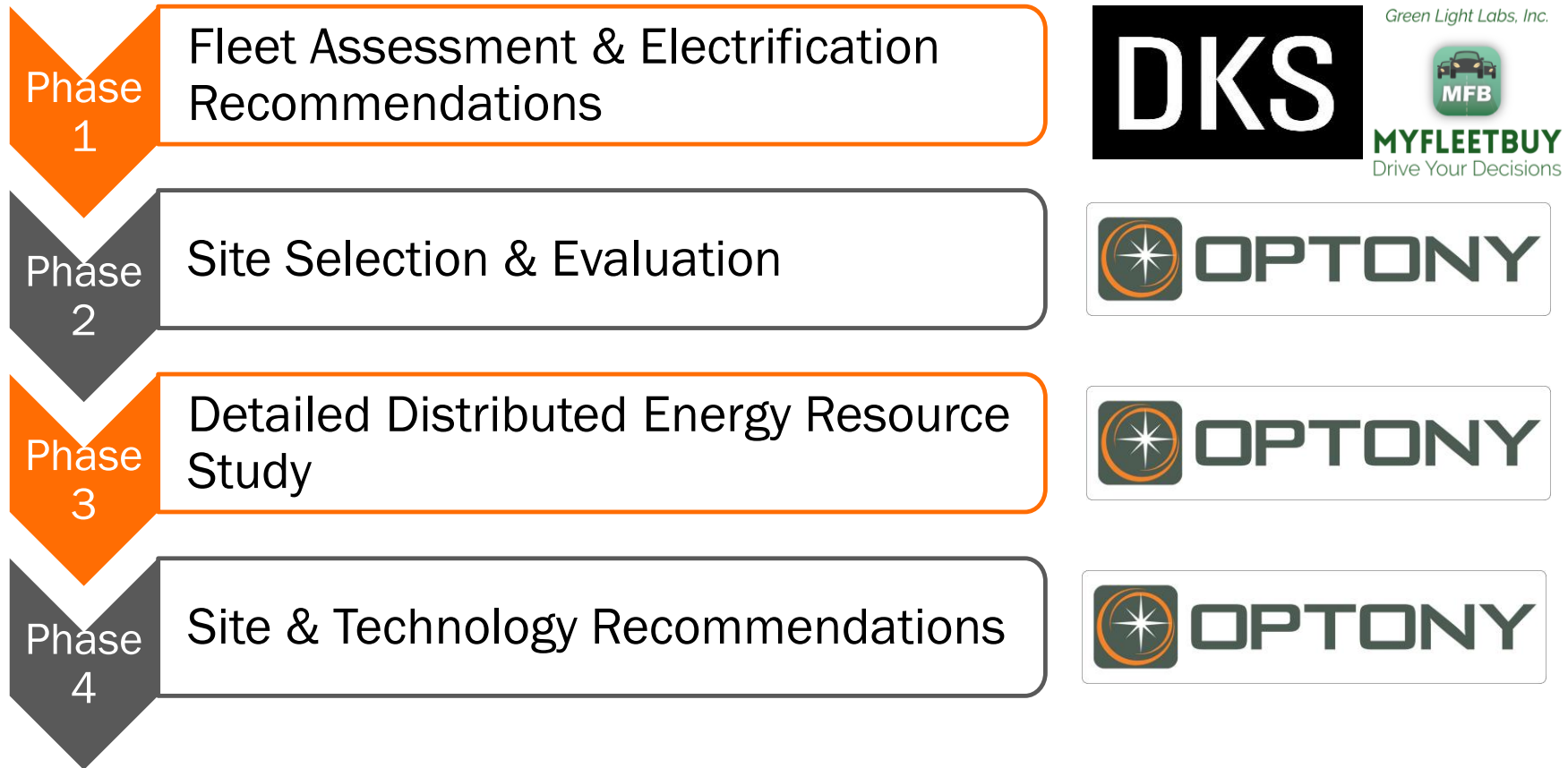
PROJECT OVERVIEW



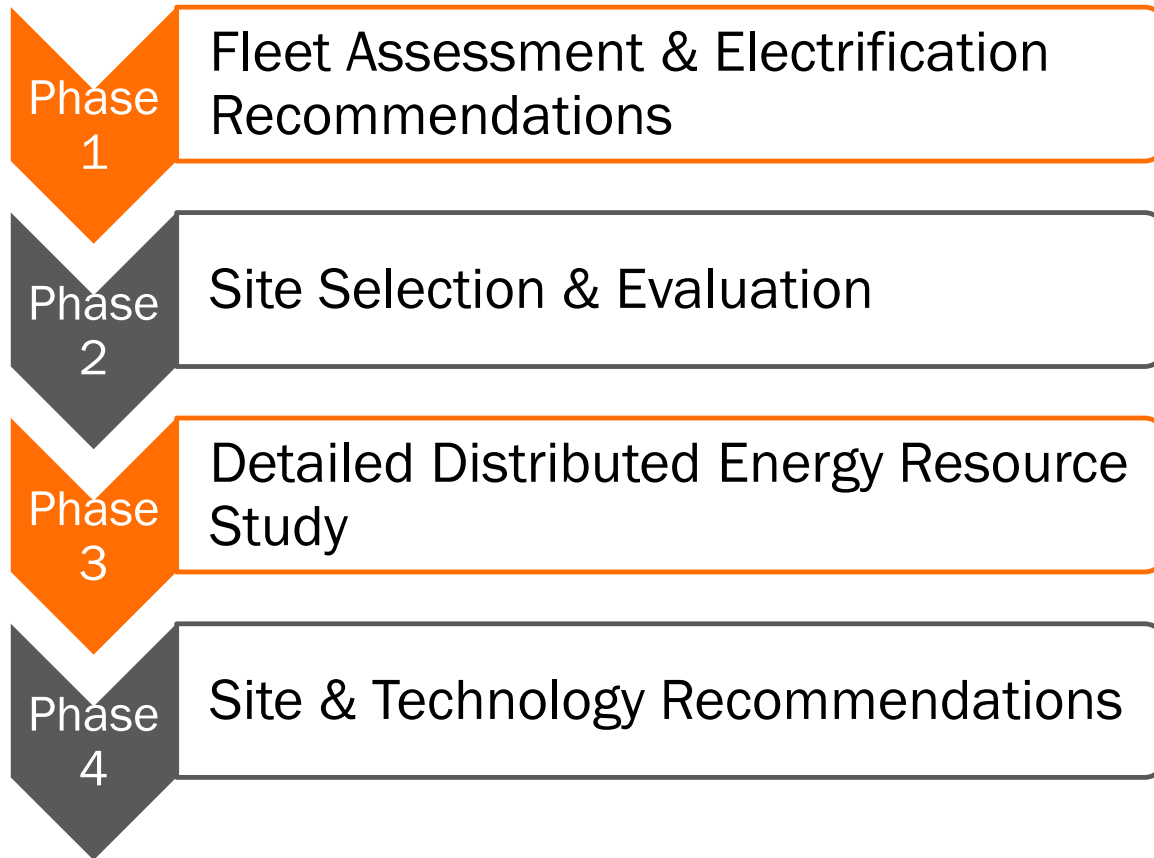
PROJECT OVERVIEW



PROJECT OVERVIEW



PROJECT OVERVIEW



Working Group &
Tool Creation

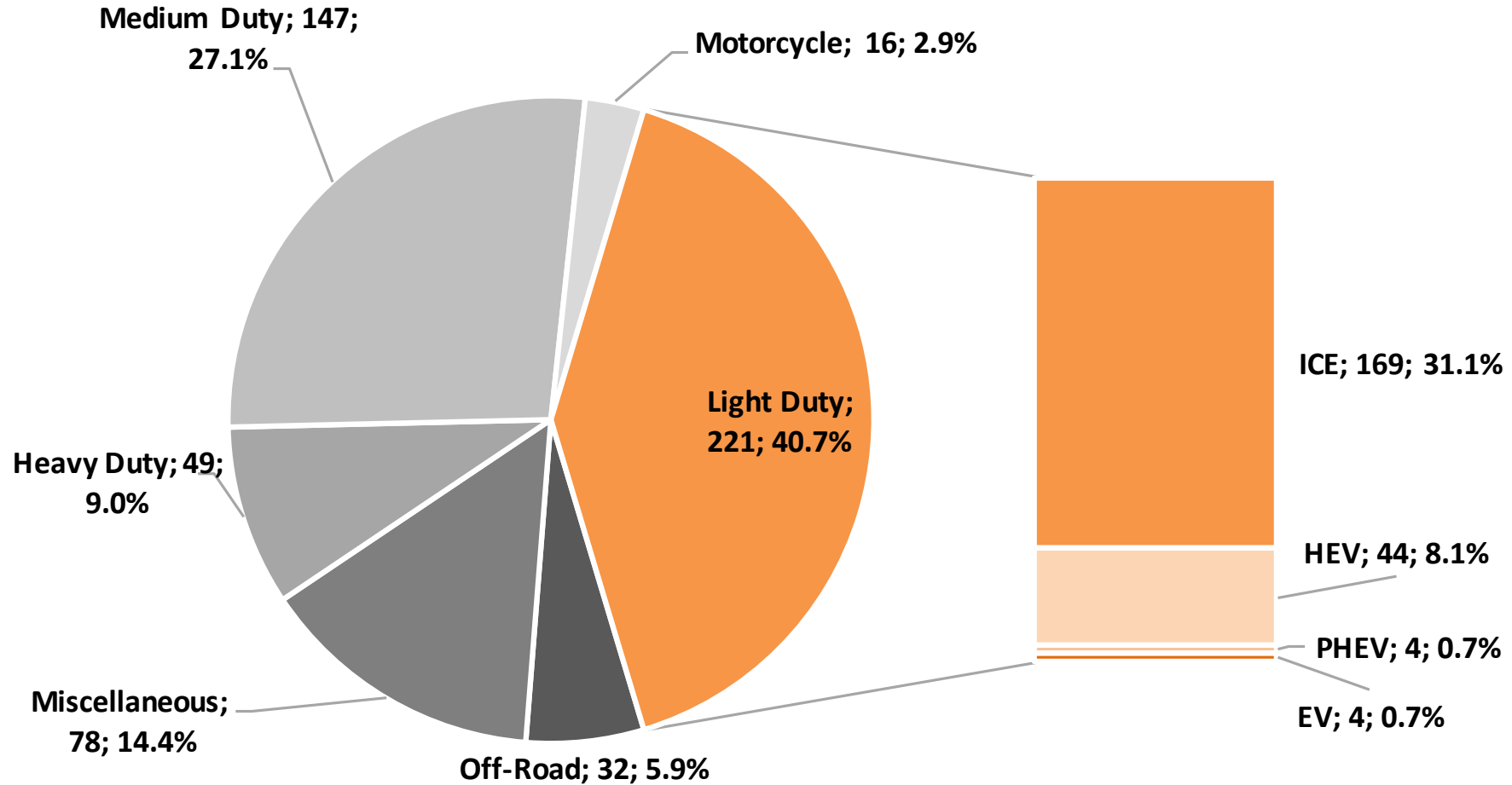




PHASE 1: PROGRESS & NEXT STEPS

CITY OF FREMONT FLEET BACKGROUND

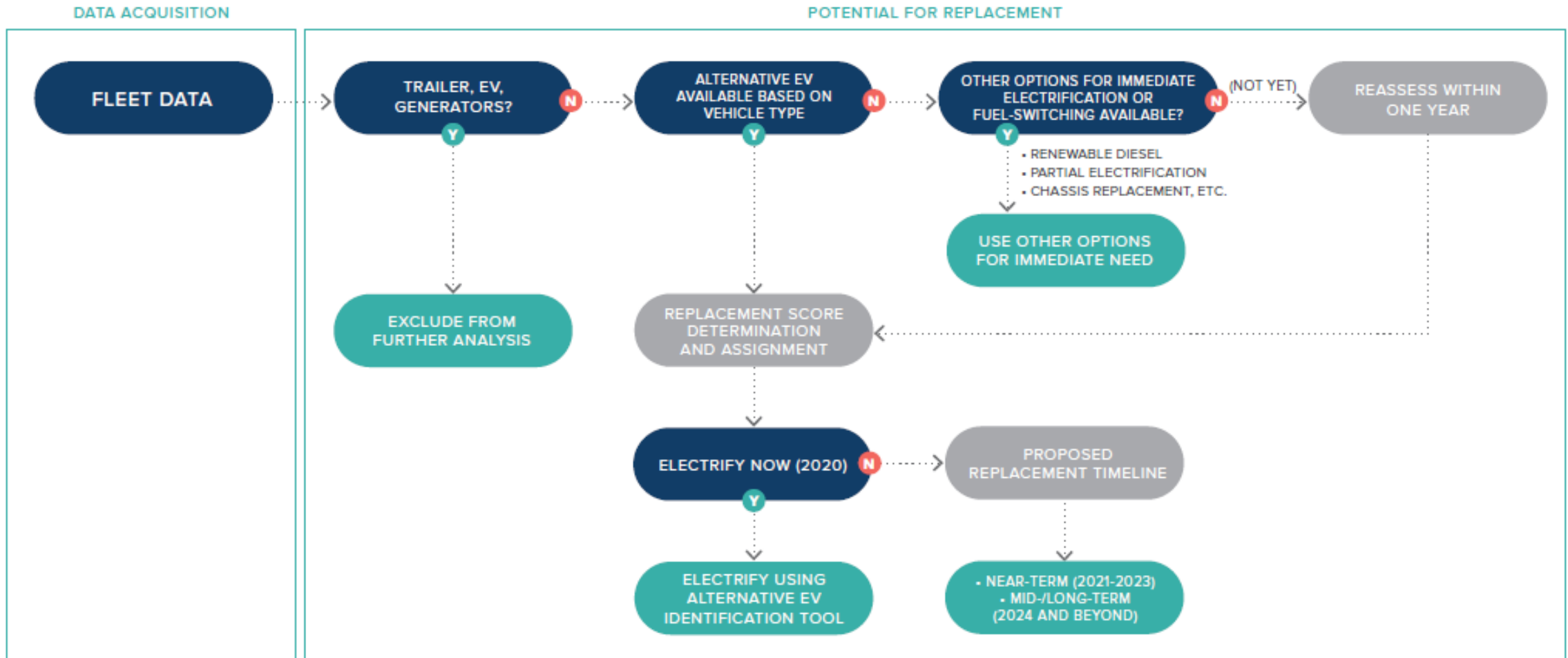
City of Fremont Fleet Overview (542 vehicles)



FLEET ELECTRIFICATION THREE-STEP PROCESS

1. Data Acquisition
2. “Potential For Replacement” Analysis
 - Potential for Replacement Tool
3. Evaluate EVs for Procurement
 - Uses the MyFleetBuy Platform for as Alternative EV Identification Tool

DATA ACQUISITION & "POTENTIAL FOR REPLACEMENT" ANALYSIS



DATA ACQUISITION

- Several databases combined/considered to create a final comprehensive database, including:
 - FASTER Vehicle Inventory
 - Fleet Inventory
 - FuelMaster (already incorporated into FASTER database)
 - Network Fleets
- Data from various sources aggregated using Vehicle/Equipment #

DATA ACQUISITION

FLEET DATA

DATA ACQUISITION

■ Sample FASTER Vehicle Inventory Database

COMMENTS	VEH #	ACQ YEAR	MODE L YEAR	VEHICLE REPL YEAR	METER TYPE	07/01/18 START MILEAGE	06/30/19 END MILEAGE	FY 17/18 USAGE	EST MILEAGE	15 PO COND FACTOR	CURRENT LTD
DEPT Pool - City Managers	27025	2007	2007	2017/2018	M	20,911	21,765	854	0	7.50	\$3,768.59
DEPT Pool - City Managers	213011	2013	2013	2023/2024	M	10,292	13,107	2,815	0	4.40	\$2,144.77
UNOFFICIAL CITY WIDE POOL	29027	2009	2009	2019/2020	M	46,485	47,103	618	0	10.60	\$6,983.03
219049 REPL 21073 Appr Low-Use-Special Purpose 3/25/15	219049	2019	2019	2029/2030	M	10	10	0	0	0.10	\$0.00
APPROVED 21069	212005	2012	2012	2022/2023	M	7,872	9,307	1,435	0	4.70	\$1,242.27
SPECIAL PURPOSE New Dept Allocation code 620-17018	216025	2016	2016	2026/2027	M	1,982	2,373	391	0	1.80	\$305.16
219046 ASSET# 22583. REPL 22024. SPECIAL PURPOSE	219046	2019	2019	2029/2030	M	10	73	63	0	0.20	\$0.00
DNR SPECIAL PURPOSE DNR Grant Funded	676	1997	1997	2009/2010	M	12,568	12,669	101	0	7.20	\$20,314.57
(3/18/16 1002 being use to replace PD 1001 DNR that has engine problems.	1002	1996	1996	2019/2020	M	73,202	73,323	121	0	15.00	\$14,825.19
SPECIAL PURPOSE DO NO REPLACE	1083	1990	1990	2002/2003	M	8,944	9,326	382	0	8.70	\$20,822.97
DNR Donation	5801	2003	2003	2013/2014	M	105,698	105,698	0	0	15.00	\$7,441.81
DNR Donation	9711	1999	1997	2009/2010	M	30,090	30,869	779	0	6.60	\$4,929.12
APP SP 2009 DNR	9916	1999	1999	2009/2010	M	33,708	34,105	397	0	11.90	\$8,461.17
DNR PIT CAR	20534	2000	2000	2019/2020	M	100,432	100,574	142	0	15.00	\$23,928.94
DNR PIT CAR	20545	2000	2000	2019/2020	M	98,941	99,082	141	0	15.00	\$24,764.80

DATA ACQUISITION

FLEET DATA

DATA ACQUISITION

■ Sample Fleet Inventory Database

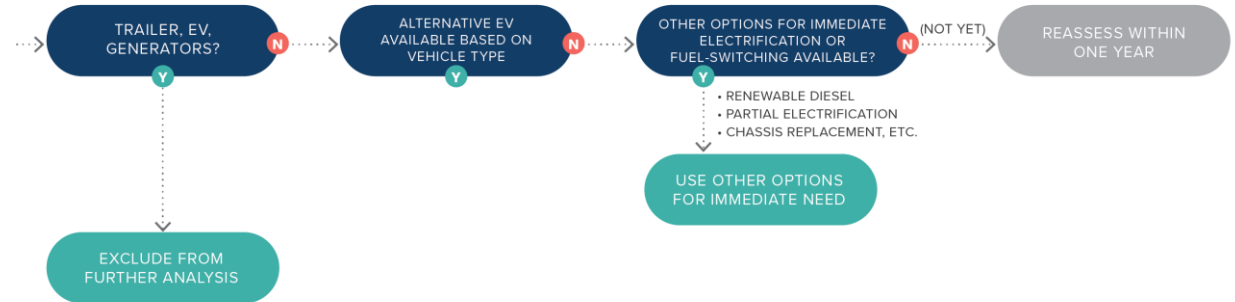
VEHICLE REPLACED & NOTES	EQUIP #	SERIAL NUMBER	FUNDING DEPT/SECTION FLEET COORDINATOR CONTACT	MAKE/MODEL	EMISSION TESTS	FUEL TYPE
CITY MANAGER'S OFFICE 1210						
DEPT Pool - City Managers	27025	JTNBB46K673041028	City Manager's Office Robin Spi	TOYOTA CAMRY HYBR	SMOG 0	Unleaded
DEPT Pool - City Managers	213011	JTDKN3DP4D3039813	City Manager's Office Robin Spi	TOYOTA PRIUS HYBRID	SMOG 1	Unleaded
CITY CLERKS OFFICE 1310						
219049 REPL 21073 Appr Low-Use-Special	219049	1FMCU0F76KUC35113	City Clerk's Office Lydon/ Gauth	FORD ESCAPE S	SMOG 1	Unleaded
UNOFFICIAL CITY WIDE POOL	29027	1FMNE11L59DA68897	City Clerk's Office Lydon/ Gauth	FORD E150 CARGO VAN	SMOG 1	Unleaded
INFORMATION SYSTEMS 1710						
APPROVED 21069	212005	NM0KS9CN6CT091628	Info Sys.	TRANSIT CONNECT VAN	SMOG 0	Unleaded
SPECIAL PURPOSE New Dept Allocation	216025	1FTYR2CM2GKB25096	Info Sys.	FORD F250 TRANSIT VAN	SMOG 0	Unleaded
219046 ASSET# 22583. REPL 22024.	219046	2T3LWRFV5KW010623	Info Sys.	TOYOTA RAV 4 HYBRID	SMOG 1	Unleaded
HUMAN SERVICES 5310						
Low use approved FRT 9951	211025	JTDKN3DU2B0270195	Human Services S. Shenfil	TOYOTA PRIUS	SMOG 1	Unleaded
20030	211026	JTDKN3DU0B0255128	Human Services S. Shenfil	TOYOTA PRIUS	SMOG 0	Unleaded
9953	213006	2C4RDGBG1DR716366	Human Services S. Shenfil	DODGE CARAVAN	SMOG 0	Unleaded
9970	213015	JTDKN3DU7D5656939	Human Services S. Shenfil	PRIUS	SMOG 1	Unleaded
218029 REPL: 20041/9904. (218029: ASSE	218029	1FMCU0F75JUC87850	Human Services S. Shenfil	FORD ESCAPE	SMOG 0	Unleaded
ASSET#22530 ADD TO FLEET HYGIENE						
TRUCK W/GENERATOR 219014A GRANT	219014	1FTRF3CTXKED68933	Human Services S. Shenfil	FORD F350 PUDRW	SMOG 1	Diesel
FUNDED						
ASSET# 22532 GENERATOR MOUNTED						
TO TRUCK 219014 TO POWER	219014A	K180460173	Human Services S. Shenfil	CUMMINS 110HDKCC-42345H		Diesel
HOMELESS HYGIENE TRAILER GRANT						

DATA ACQUISITION

FLEET DATA

“POTENTIAL FOR REPLACEMENT” ANALYSIS: TOOL AND STEPS

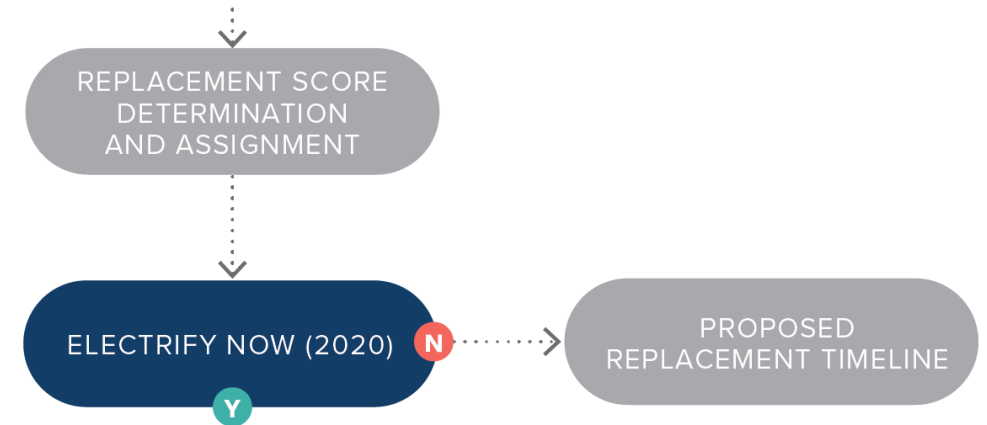
- Exclude non-electrifiable fleet components
 - Existing EVs, Trailers, Generators



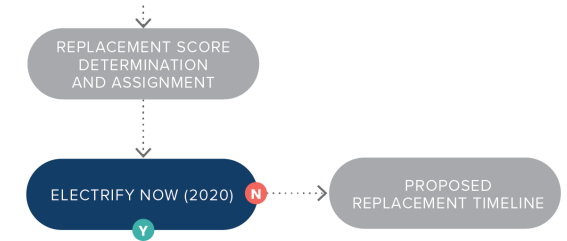
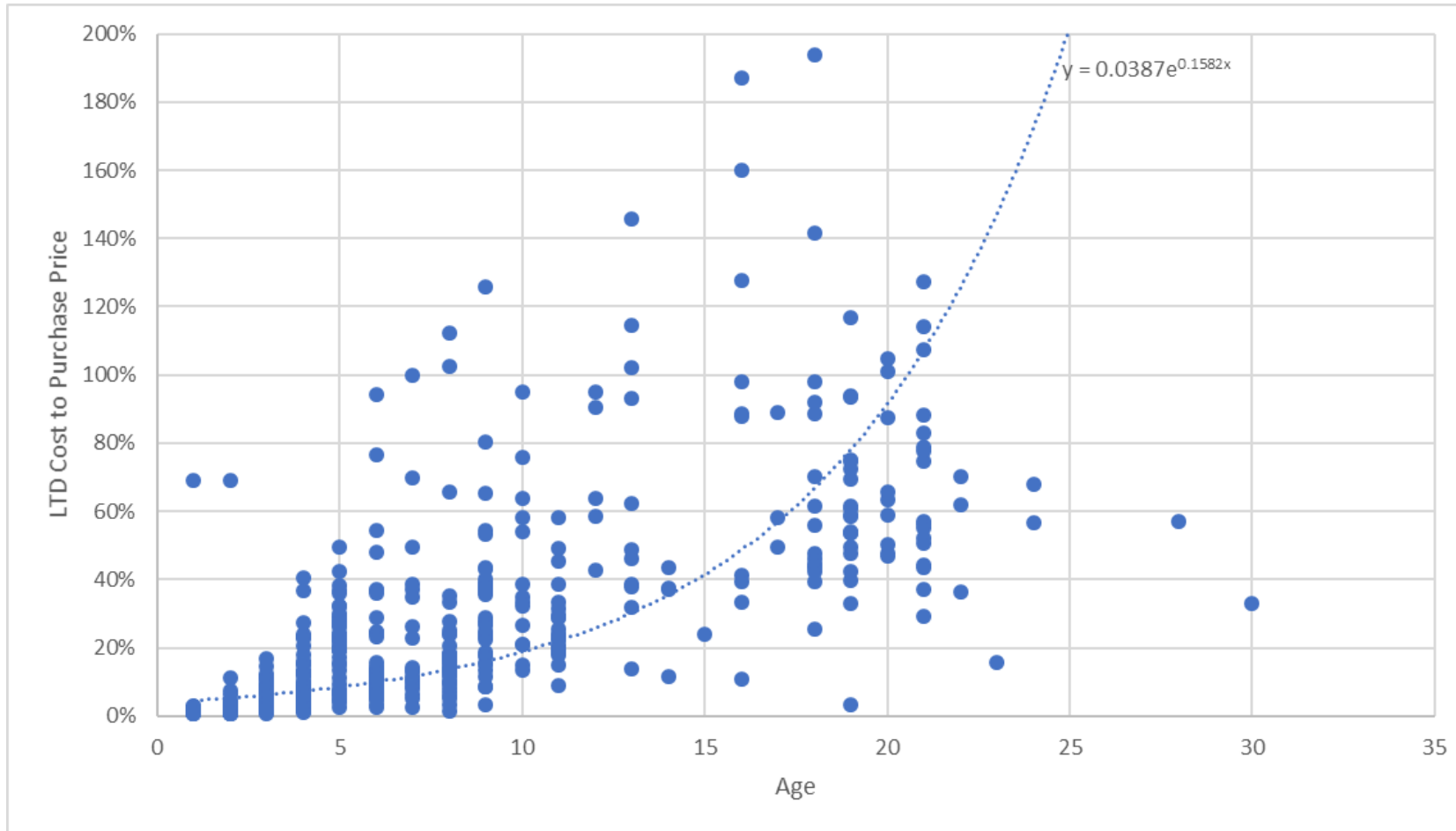
- Based on vehicle body type, consider if an EV is currently available
- If no current or near-term EV alternatives are available, consider other options:
 - Renewable Diesel, Partial Electrification, Chassis Replacement

“POTENTIAL FOR REPLACEMENT” ANALYSIS: TOOL AND STEPS

- Assign score to fleet based on the electrification sequencing
- Determine Score Using the Following Variables
 - Vehicle Age
 - Vehicle Mileage
 - Vehicle Operations & Maintenance (O&M) Costs
- Score Forecast in the Future
 - Vehicle Age: linear trendline
 - Vehicle Mileage: linear trendline
 - Vehicle O&M Costs: exponential trendline using the existing City of Fremont O&M Costs



VEHICLE O&M COST TRENDLINE



“POTENTIAL FOR REPLACEMENT” ANALYSIS: TOOL AND STEPS

- NEAR-TERM (2021-2023)
- MID-/LONG-TERM (2024 AND BEYOND)

CURRENTLY AVAILABLE EV TECHNOLOGY



NEAR-TERM EV TECHNOLOGY

Vehicles and related technology that have been announced by the industry



MID-TERM EV TECHNOLOGY

Vehicles and related technology likely to be produced in this timeframe



LONG-TERM EV TECHNOLOGY

Beyond 2030 and impossible to predict



MYFLEETBUY PROCESS FOR ANALYSIS

Reminder: Fleet Electrification Three Step Process

3. Evaluate EVs for Procurement

MyFleetBuy web-based platform is a resource for the City and the consultant team to visualize and analyze vehicle fleet data

- Data acquisition and input into MFB tool
- Additional work to be done
- MyFleetBuy analysis tool

MYFLEETBUY PLATFORM – WEB-BASED TOOL

MyFleetBuy

City of Fremont N

Logout

Home

Analytics

DATE
11/01/18 - 01/15/20

Dist Flag : networkfleet_true × Body Type : SUV × Body Type : Sedan × Body Type : Hatchback × Filter your car

8 cars selected

Cars to compare ADD

- 2018 Chevrolet Bolt ×
- 2018 Chevrolet Volt ×
- 2018 Nissan Leaf SV ×
- 2018 Mitsubishi Outlander Phev ×

Results COMPUTE

EV VIABILITY

DEPARTMENTS	EV VIABILITY SCORES			
	Bolt	Volt	Leaf SV	Outlande...
211004 // 2011 FORD ESCAPE HYBRID SUV 34951 - 1FMCU5K38BKA50654	67 %	100 %	52 %	100 %
218012 // 2018 FORD ESCAPE FWD SUV 34959 - 1FMCU0F79JUC12035	100 %	100 %	100 %	100 %
211003 // 2011 FORD ESCAPE HYBRID SUV 34964 - 1FMCU5K36BKA50653	76 %	100 %	66 %	100 %
212006 // 2012 FORD ESCAPE 4x4 SUV 34976 - 1FMCU9D76CKB32102	90 %	100 %	65 %	100 %
218009 // 2018 FORD ESCAPE FWD SUV 34958 - 1FMCU0F77JUC12034	100 %	100 %	100 %	100 %
29023 // 2009 TOYOTA PRIUS Hatchback 34977 - JTDKB20U997872635	100 %	100 %	96 %	100 %
218004 // 2018 FORD FUSIONSH Sedan 34971 - 3FA6P0UU5JR125344	100 %	100 %	96 %	100 %

Charging Stations EDITOR

- Site - FREMONT EV / STE...**
1x Level 2
- Site - FREMONT EV / STE...**
1x Level 2
- Site - FREMONT EV / CAP...**
2x Level 2

DATA ACQUISITION AND INPUT

- Troubleshoot FASTER data to load into MyFleetBuy platform
- Load available telematic data and available charging locations
- Create filters for vehicle search within MyFleetBuy platform
 - Work with DKS to identify which filters are the most useful
 - Example filters: vehicle body type, department, network fleets

AVAILABLE DATA

CORRESPONDING OUTPUTS

2-min interval location data

109 Vehicles



- EV equivalents based on actual vehicle energy usage (including driver behavior)
- Trip by trip granularity
- Charging station location recommendations

High Granularity

Rolling Fuel Usage & Odometer Readings

433 Vehicles



- EV equivalents based on estimated daily usage
- Charging station locations based solely on existing Fremont properties

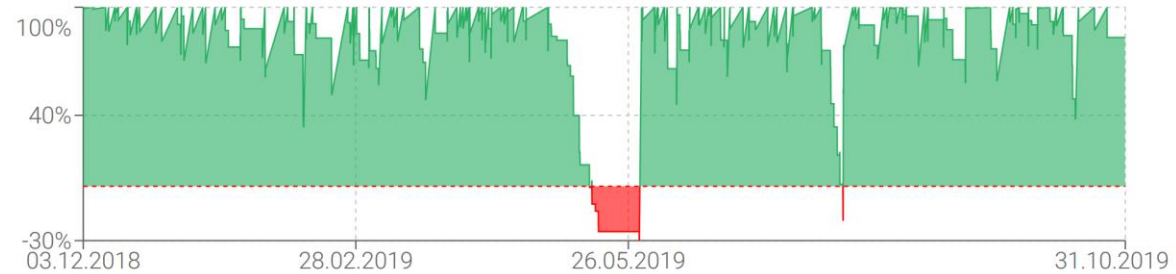
Low Granularity

EXAMPLE OF HIGH RESOLUTION OUTPUTS

STATE OF CHARGE

Leaf SV **96%**

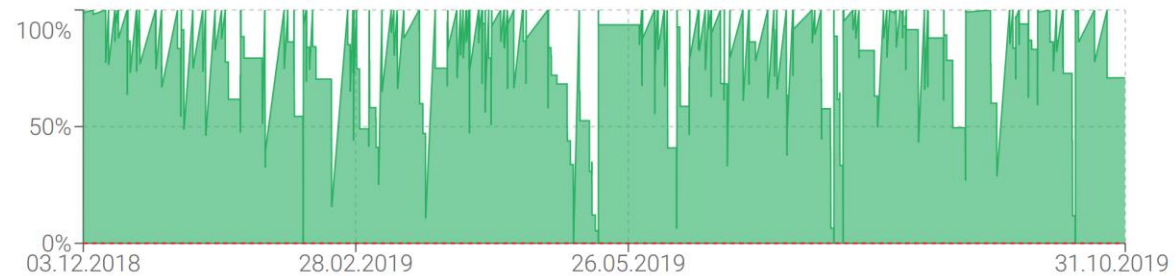
Trips met without running out of charge



Zoom Out

Volt **100%**

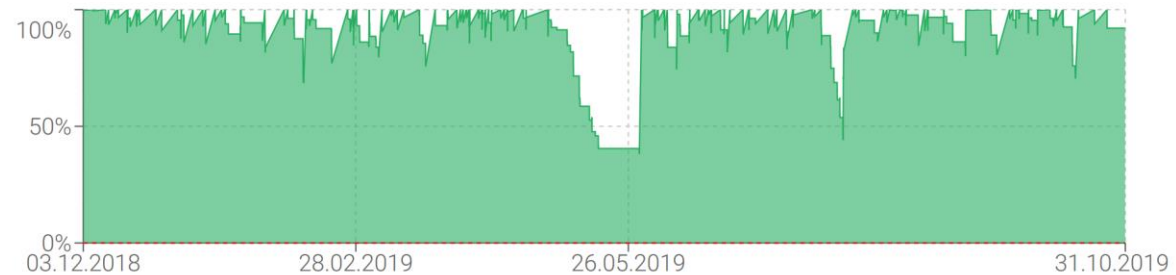
Trips met without running out of charge



Zoom Out

Bolt **100%**

Trips met without running out of charge



NEXT STEPS CURRENTLY UNDERWAY

- Extract the monthly mileage of each vehicle (using the Monthly report #4113 XML files)
- Estimate daily miles traveled
 - Take the monthly mileage per vehicle, divide it equally by the number of working days in each month
- Clean up data
 - Remove any outliers (significantly high or negative numbers)
- Incorporate idling time

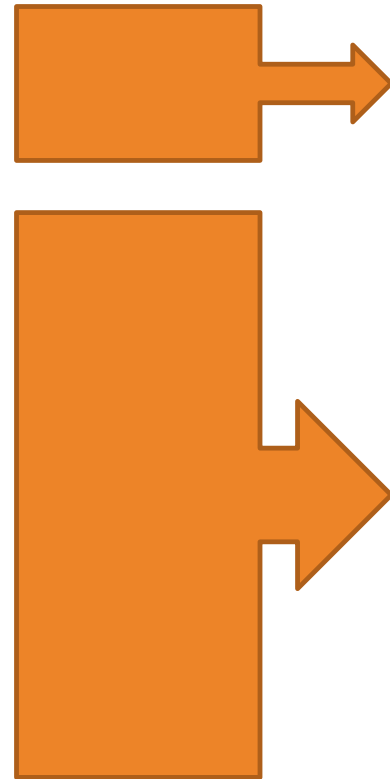
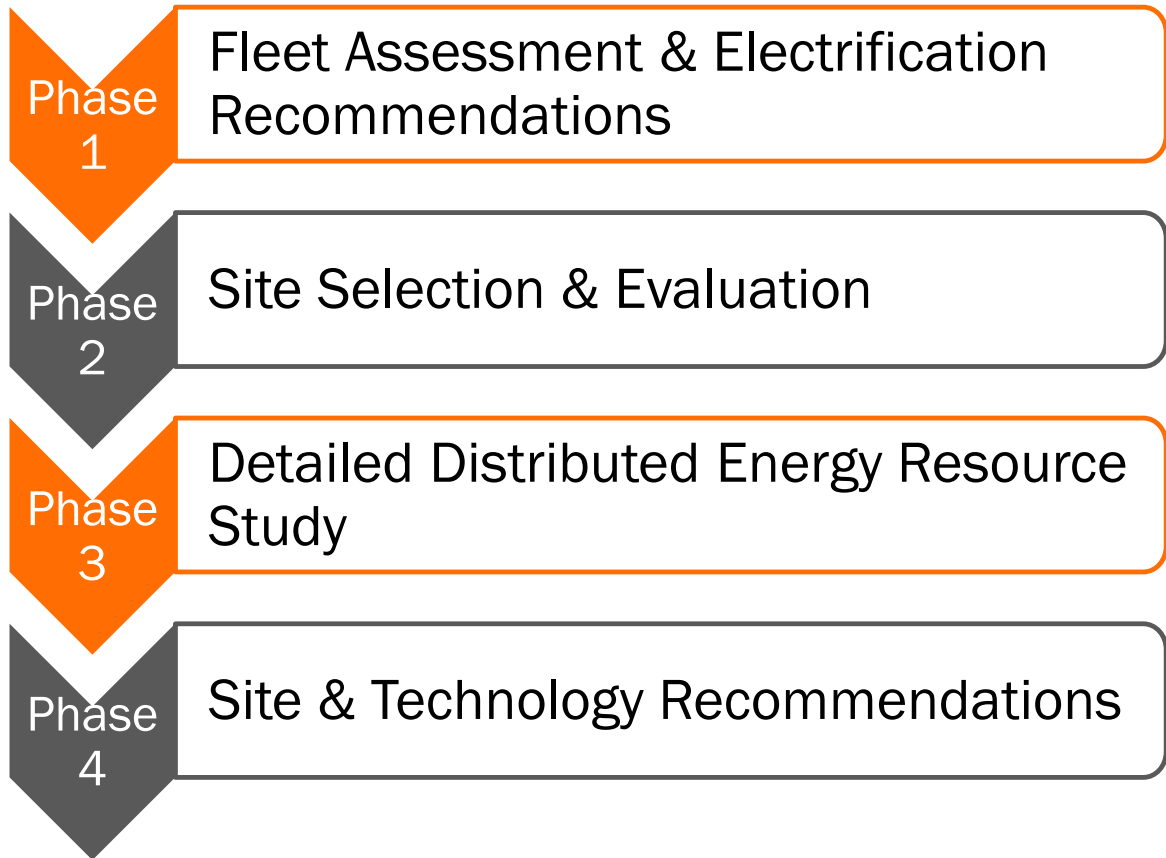
MYFLEETBUY DATA ANALYSIS TOOL

- [Live demo \[link\]](#)
- [Video demo \[link\]](#)



VEHICLE ELECTRIFICATION TOOL

PUBLIC TOOL OVERVIEW



Vehicle Electrification Assessment Tool

Facility Assessment Tool
(Addressed in Working Group Meeting 2 & 3)

VEHICLE ELECTRIFICATION TOOL - INTRODUCTION

Tasked with leveraging project methodology to “develop tools for local governments’ screening of decarbonization opportunities in municipal buildings and fleets.”

“A checklist & Excel-based tool”

VEHICLE ELECTRIFICATION TOOL - INTRODUCTION

Tool Goals (what we know):

- *Online, interactive decision tree*
- *Guiding the user through the fleet/vehicle electrification process*
- *As user clicks through decision tree, there will be informational & analytical “pull-offs” & “off-ramps”*
- *“Pull-offs” provide additional information or analytical insight within tool*
- *“Off-ramps” link to external resources or other tools*

VEHICLE ELECTRIFICATION TOOL - INTRODUCTION

What we don't know:

- *Exact scope of the analytical portion*
- *How to ensure it is complimentary, not redundant, to existing tools*

VEHICLE ELECTRIFICATION TOOL - DESIGN ACTIVITY OBJECTIVES

Task for breakout groups is twofold:

- *Review decision tree for improvements to flow and opportunities for more information and analytical insight (“pull-offs”/”off ramps”)*
- *Brainstorm and prioritize data inputs and analytical/informational outputs based on “pull-off” opportunities identified*



VEHICLE ELECTRIFICATION DESIGN ACTIVITY

NEXT STEPS

WORKING GROUP MEETINGS – MEETING #2

Tentatively: 1st week of June 2020**

Part 1: Phase 2 progress & additional feedback on draft Fleet Electrification Tool

Part 2: Storyboarding/Brainstorming for Facility Screening Tool

Target Audience: Fleet Managers, Local Government Facility Planners, Facility Managers and Sustainability Staff, EVSE Suppliers, DER Solutions Providers, OEMs

** Exact date subject to change.



THANK YOU