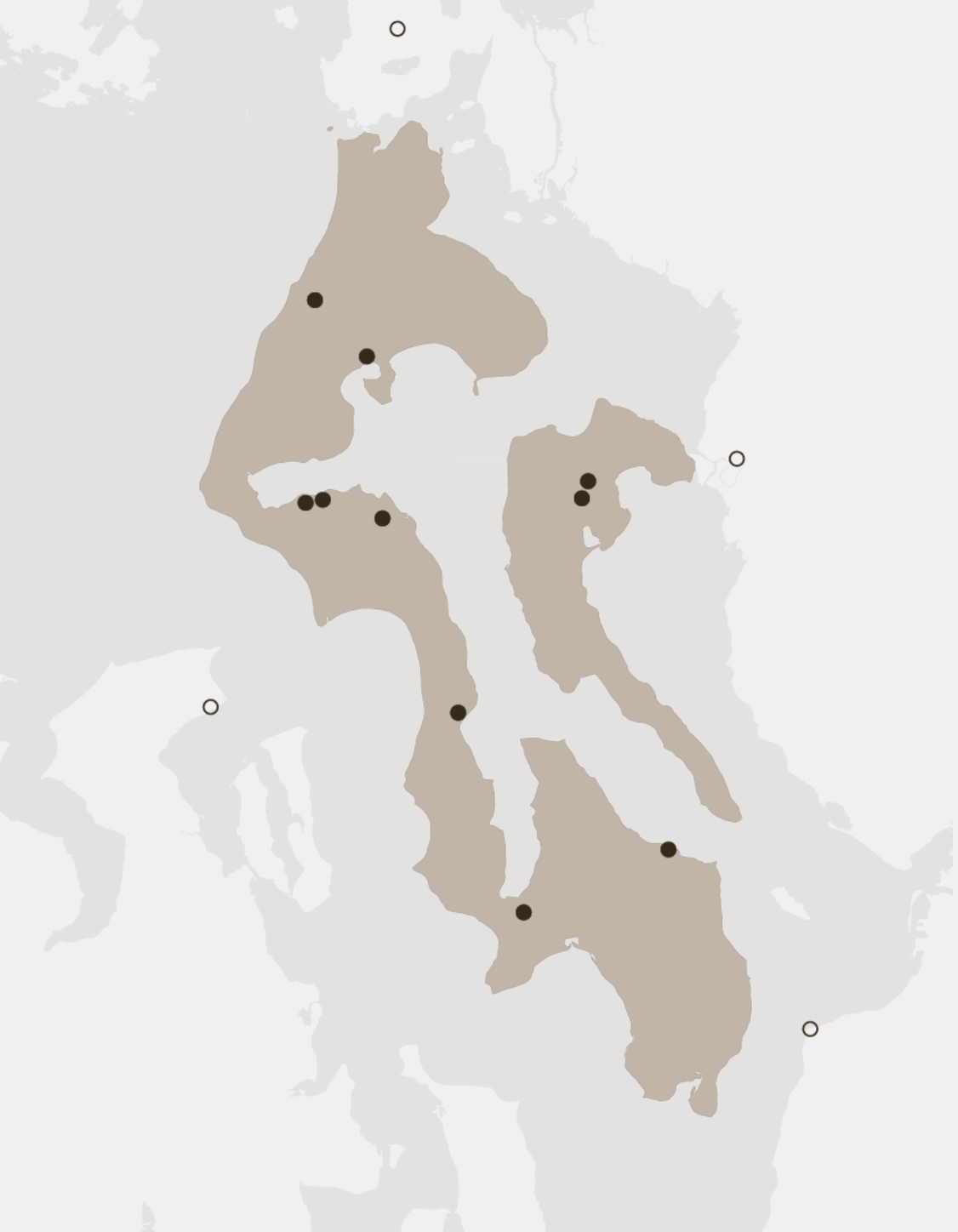


ISLAND REGION VEHICLE ELECTRIFICATION STUDY

Island Regional Transportation Planning Organization
Executive Board briefing
March 24, 2021

PROJECT OBJECTIVES

- Provide relevant electromobility trends
- Conduct public outreach to engage Island County residents and gather charger needs information
- Compile fleet data and charger locations, identify charging infrastructure gaps, and identify fleet electrification opportunity for participating jurisdictions
- Identify EV-ready building codes applicable to Island County
- Draft regional policies to increase electric vehicle adoption and support countywide infrastructure accessibility

PROJECT APPROACH AND TIMELINE

PHASE I
EXISTING CONDITIONS
AUG-OCT

Kick-off meeting; data gathering of existing conditions

Fleet information compilation

Map of existing chargers and locations

Typical charger unit cost estimates

PHASE II
PUBLIC ENGAGEMENT
SEP-DEC

Develop branding materials, engagement map tool, and outreach strategy

Conduct public outreach

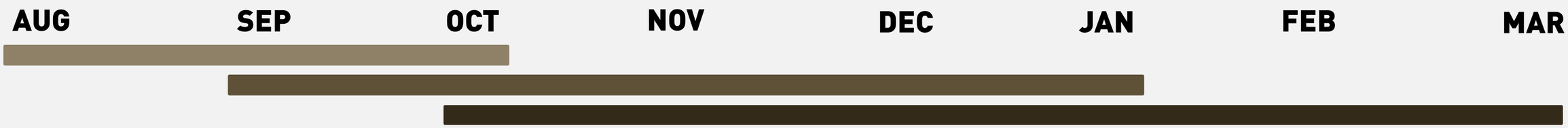
Identify potential charging station hosts

PHASE III
CODE & POLICY DEVELOPMENT
OCT-MAR

Planning code review and recommendations

Charging station design guidance toolbox

Draft IRTPO policies



TODAY'S AGENDA

Electromobility trends

Survey results

Opportunities for municipal fleet electrification

Draft IRTPO Policy

ELECTROMOBILITY TRENDS

ELECTROMOBILITY TRENDS

Electromobility 101

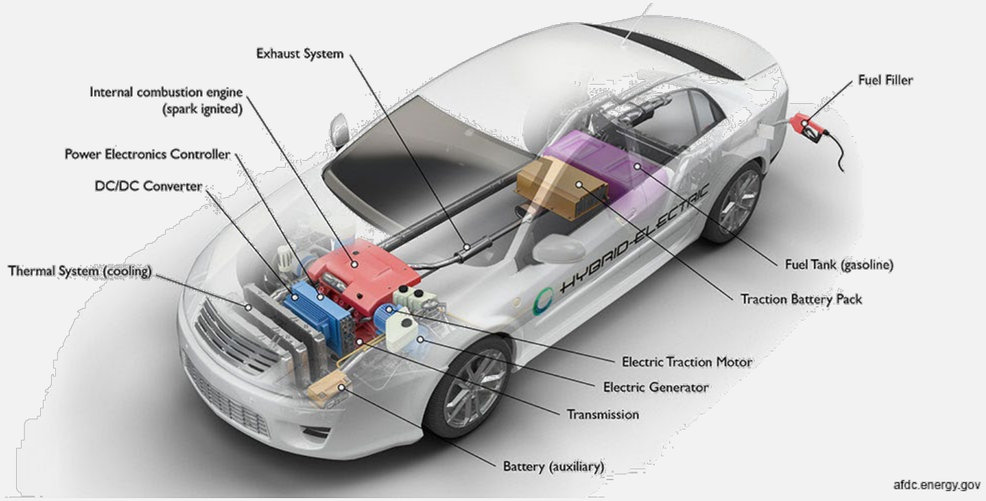
Benefits of electric vehicles

Electric vehicle adoption

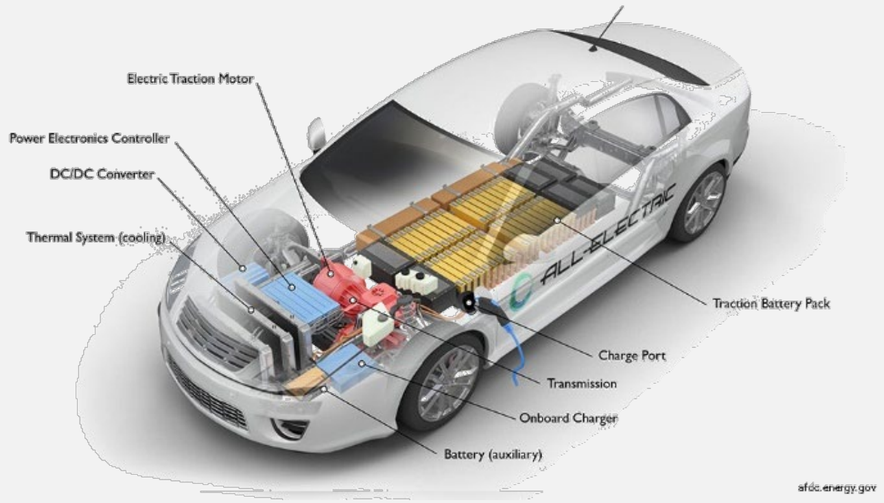
Emerging trends

ELECTRIC VEHICLE TYPES

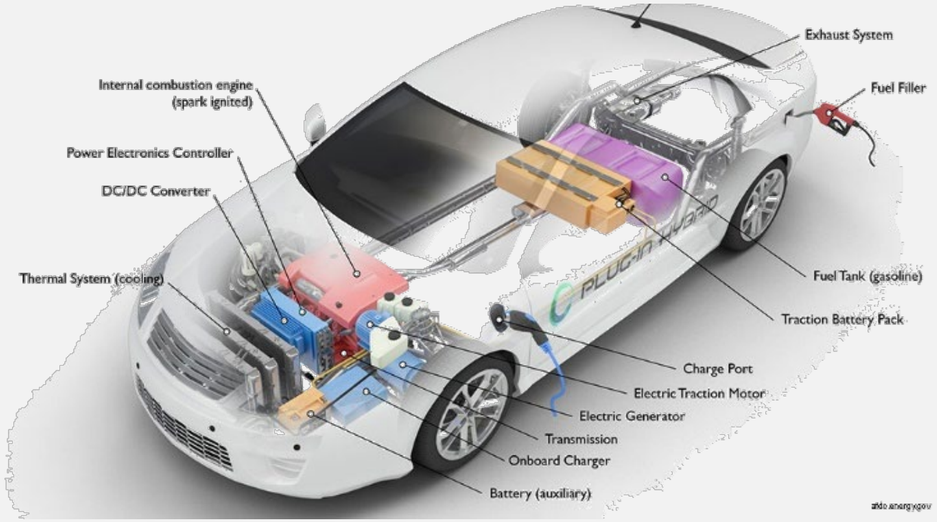
HYBRID ELECTRIC VEHICLE (HEV)



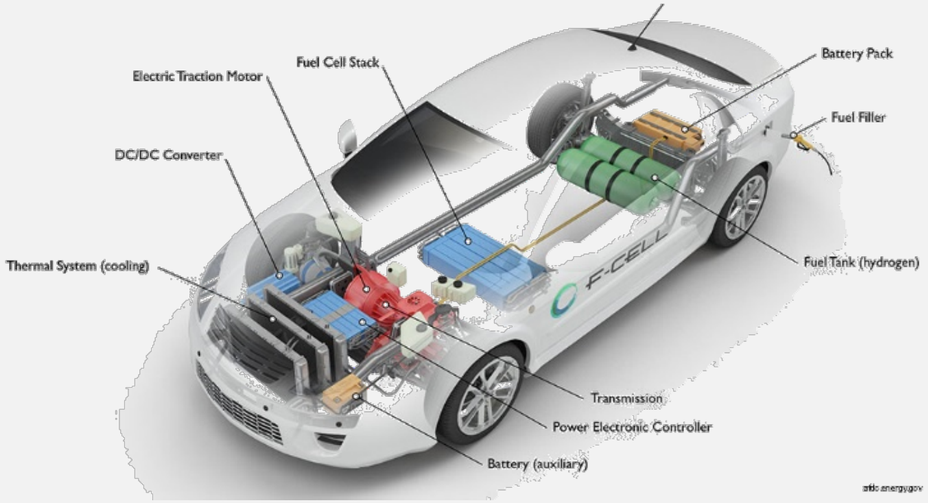
BATTERY ELECTRIC VEHICLE (BEV)



PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)



FUEL CELL ELECTRIC VEHICLE (FCEV)



ELECTRIC VEHICLE CHARGING

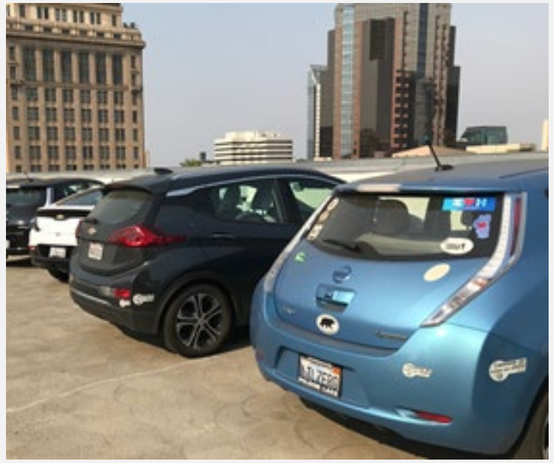
RESIDENTIAL

WORKPLACE

OPPORTUNITY

DESTINATION

FLEET



CHARGING STATION

KNOW YOUR EV CHARGING STATIONS

AC Level One

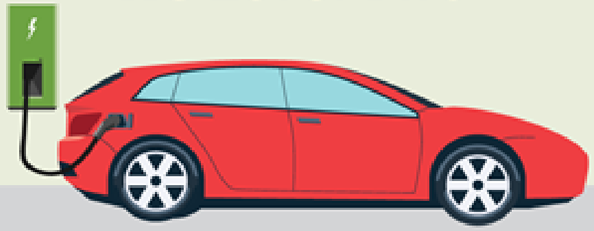
VOLTAGE
120v 1-Phase AC

AMPS
12–16 Amps

CHARGING LOADS
1.4 to 1.9 KW

CHARGE TIME FOR VEHICLE
3–5 Miles of Range Per Hour

AC Level Two



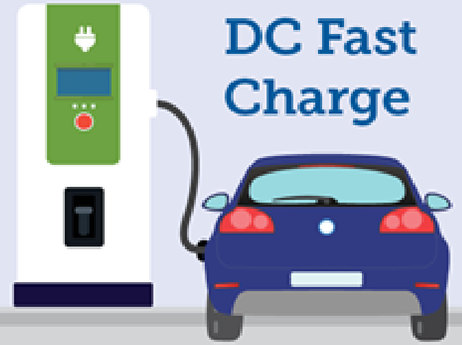
VOLTAGE
208V or 240V 1-Phase AC

AMPS
12–80 Amps (Typ. 32 Amps)

CHARGING LOADS
2.5 to 19.2 kW (Typ. 7 kW)

CHARGE TIME FOR VEHICLE
10–20 Miles of Range Per Hour

DC Fast Charge



VOLTAGE
208V or 480V 3-Phase AC

AMPS
<125 Amps (Typ. 60 Amps)

CHARGING LOADS
<90 kW (Typ. 50 kW)

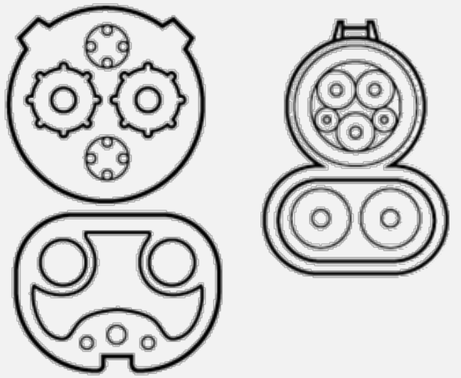
CHARGE TIME FOR VEHICLE
80% Charge in 20–30 Minutes

CHARGING STATION TYPES

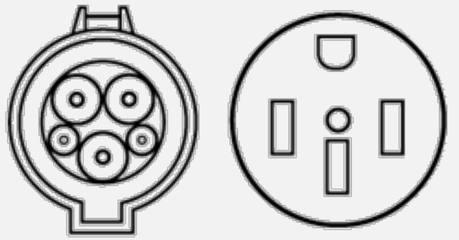
The Charging Pyramid

Power Level	Vehicle Dwell Time	Cost to Charge
DC Fast Charging	*Travel* 20 min	$$$$
High Power AC	*Public* 0.5 - 3 hours	$$$
Mid Power AC	*Workplace* 4 - 8 hours	$$
Low Power AC	*Residential* 8 - 10 hours	$

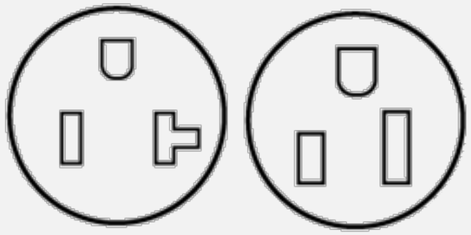
DIRECT CURRENT FAST CHARGING



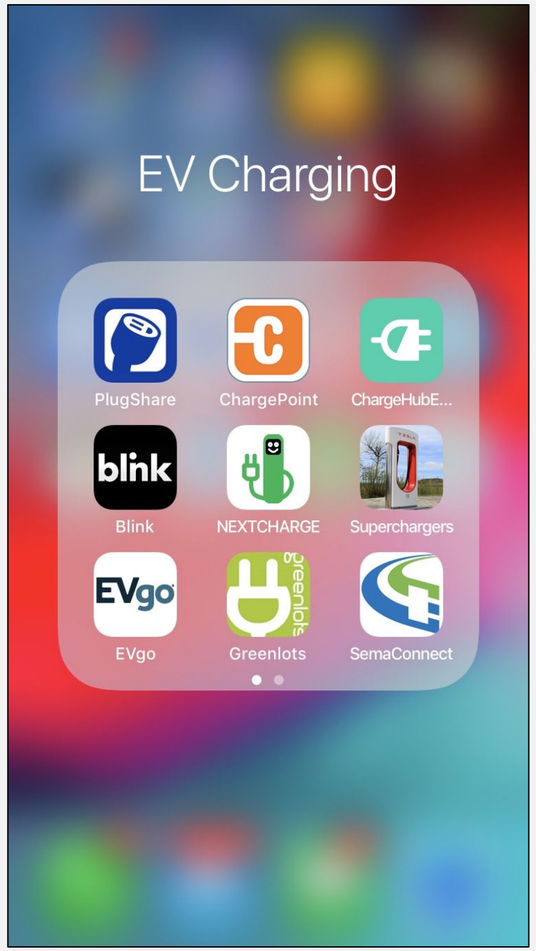
LEVEL 2 CHARGING

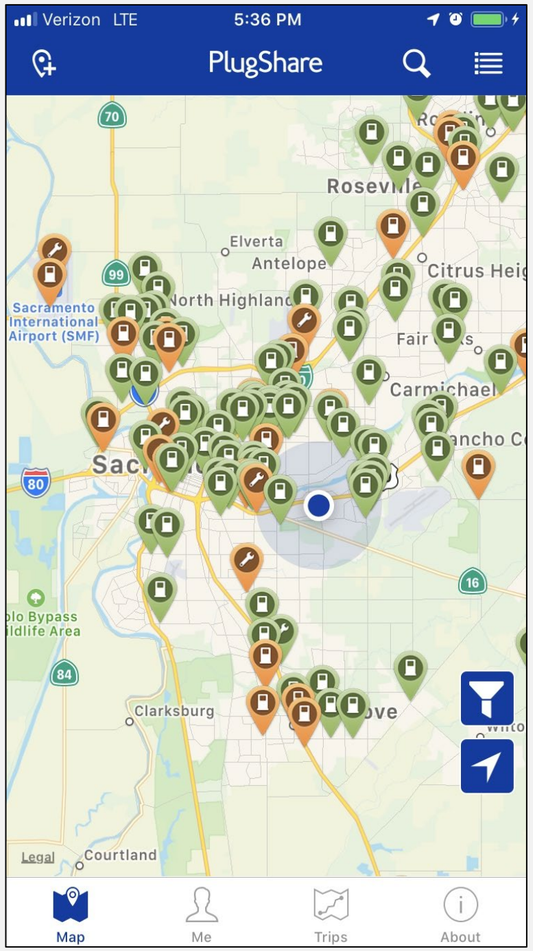


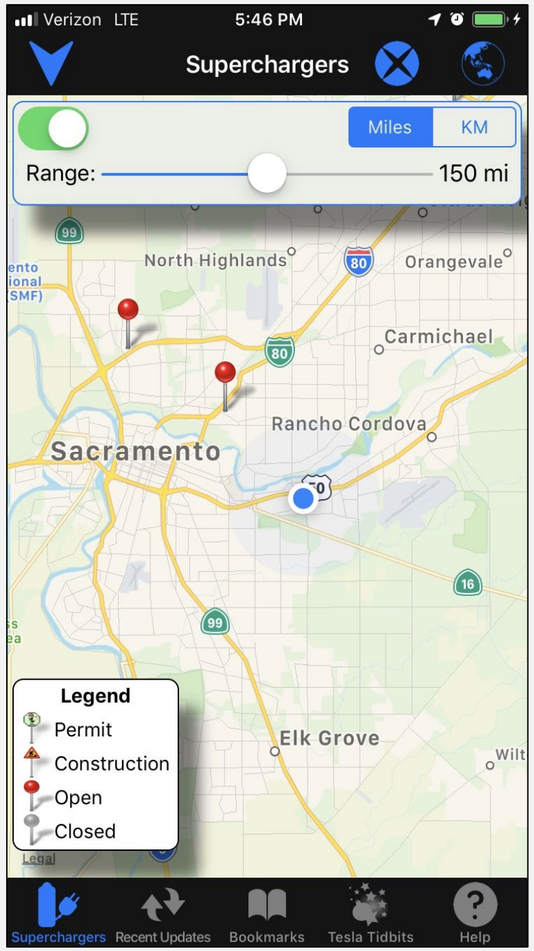
LEVEL 1 CHARGING

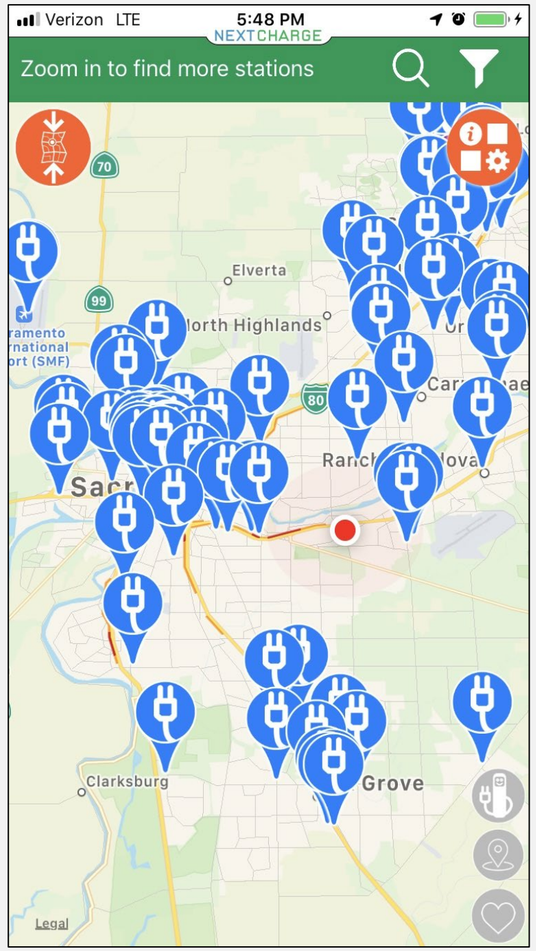


HOW TO FIND CHARGING STATIONS?









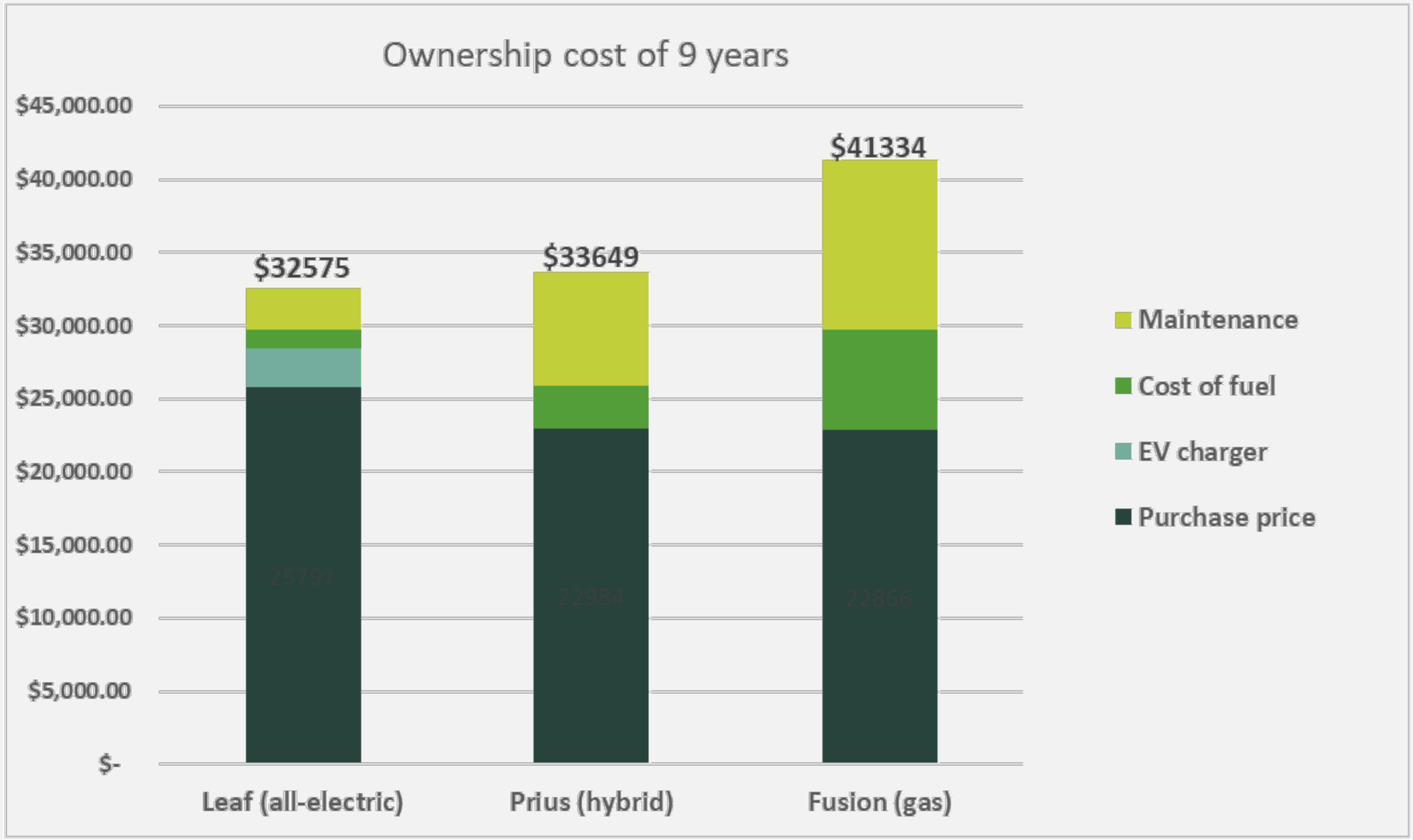
BENEFITS OF ELECTRIC VEHICLES

Energy efficient

Less greenhouse gas emissions

Reduced fuel, maintenance, and operating costs

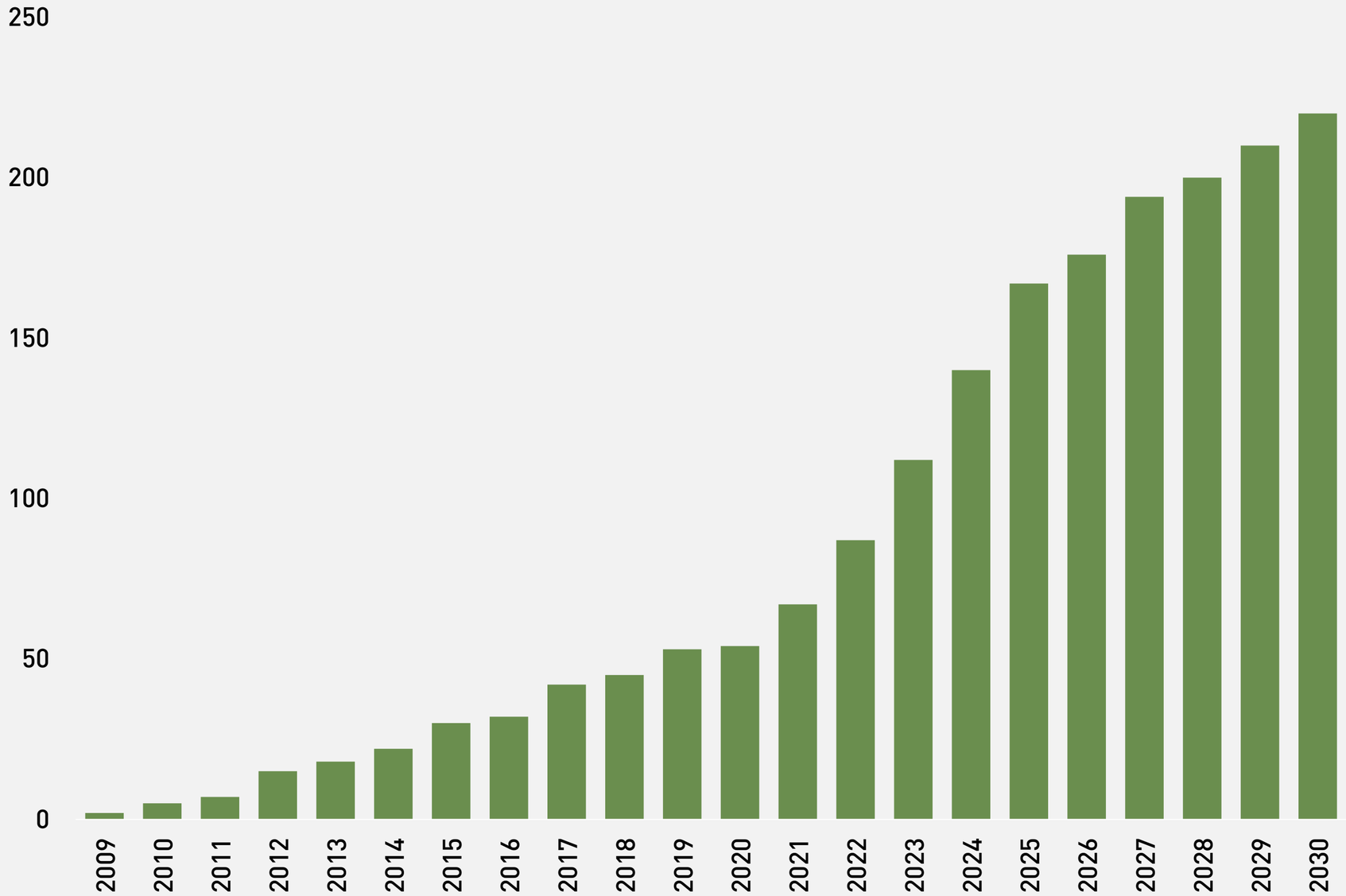
Lower total cost of ownership



Source: City of New York, NY

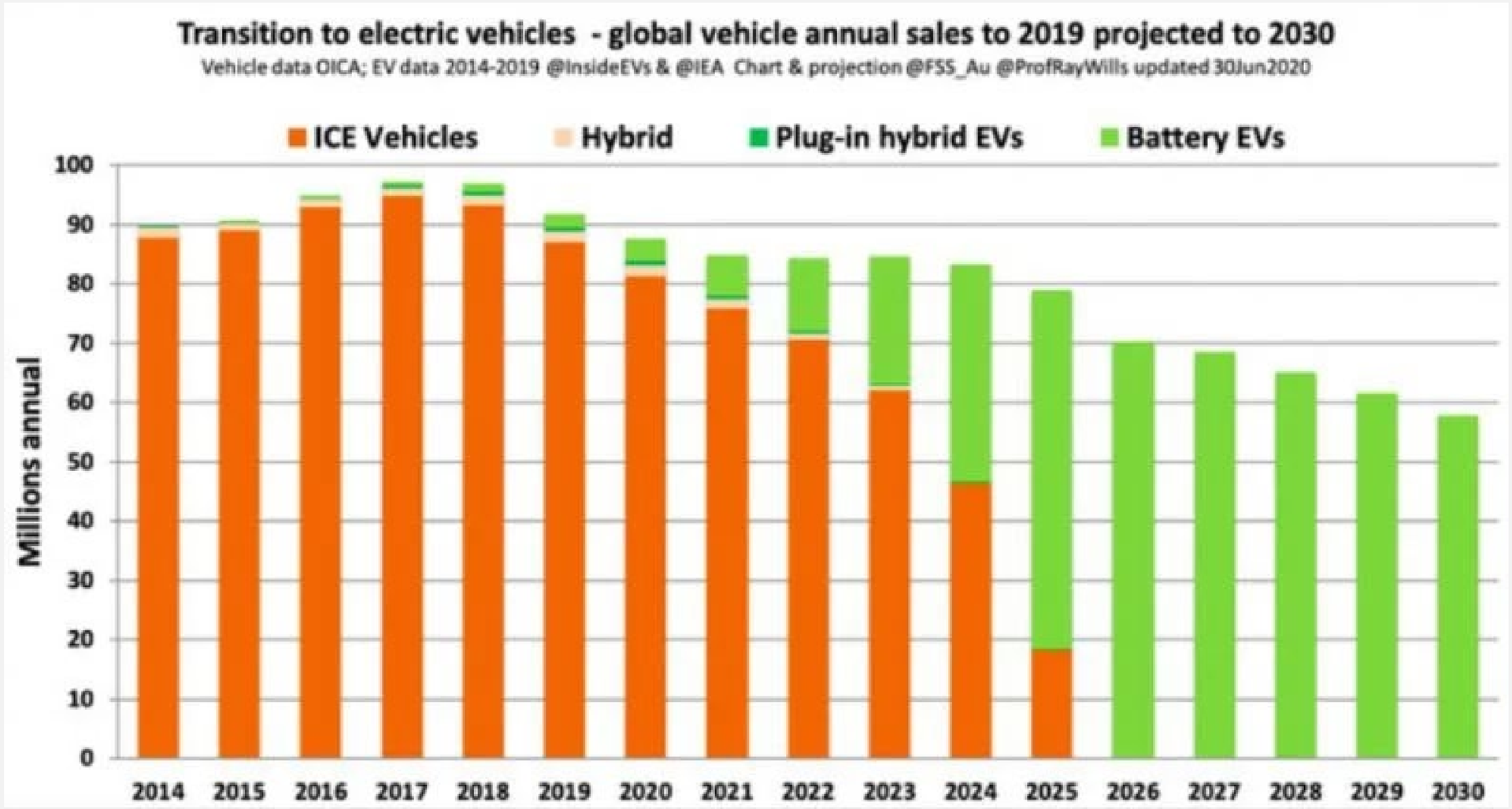
EV MARKET GROWTH

Number of BEV + PHEV Models in the US by year



Source: ITS Davis

SALES PROJECTIONS BY VEHICLE TYPE



EV TECHNOLOGY: WHAT DO WE KNOW?

AVAILABLE

2021

NEAR-TERM

Vehicles and related technology have been announced by the industry

2022-2023

MID-TERM

Can predict vehicles and related technology likely to be produced

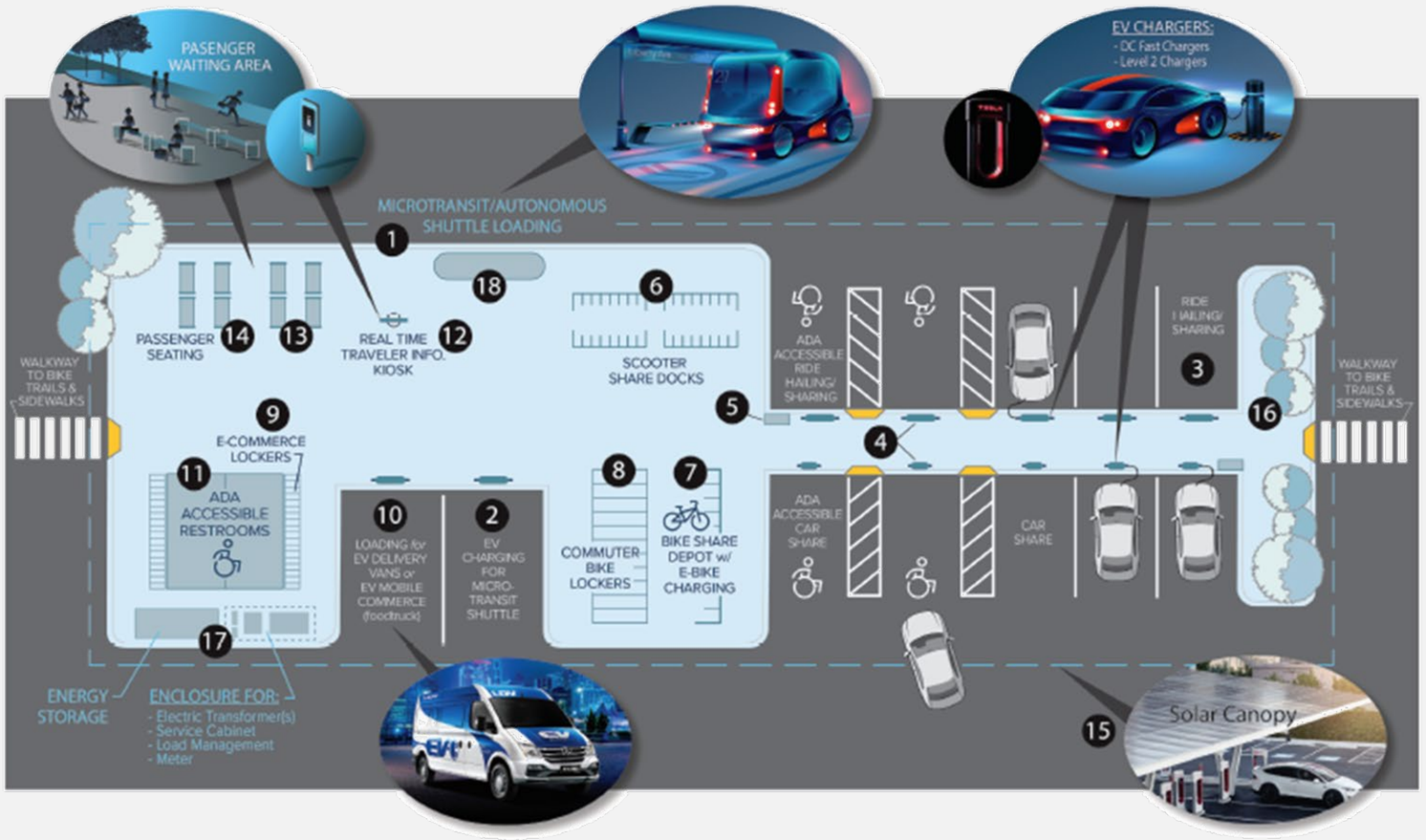
2024-2030

LONG-TERM

Beyond 2030 it is difficult to predict

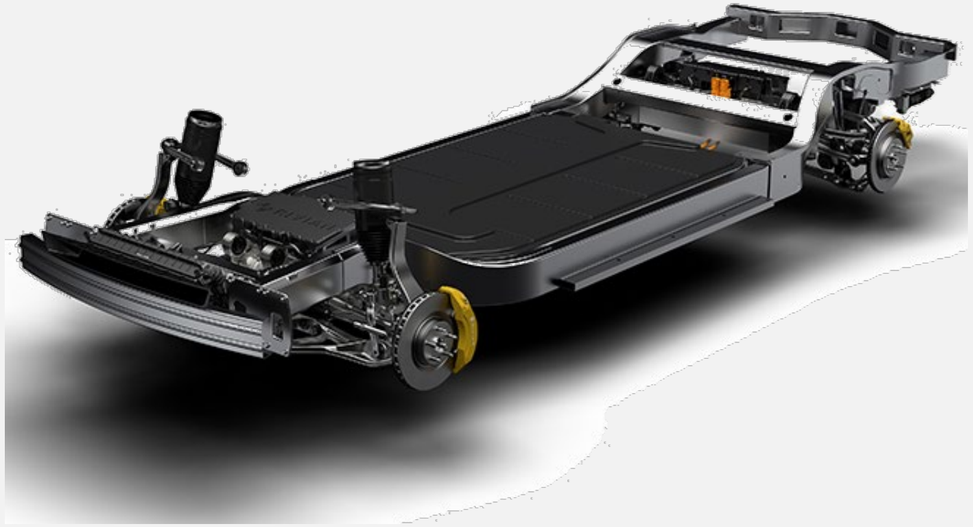
2030 & BEYOND

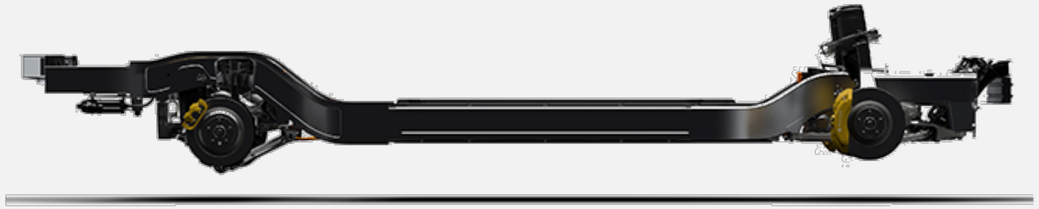
MOBILITY REVOLUTION



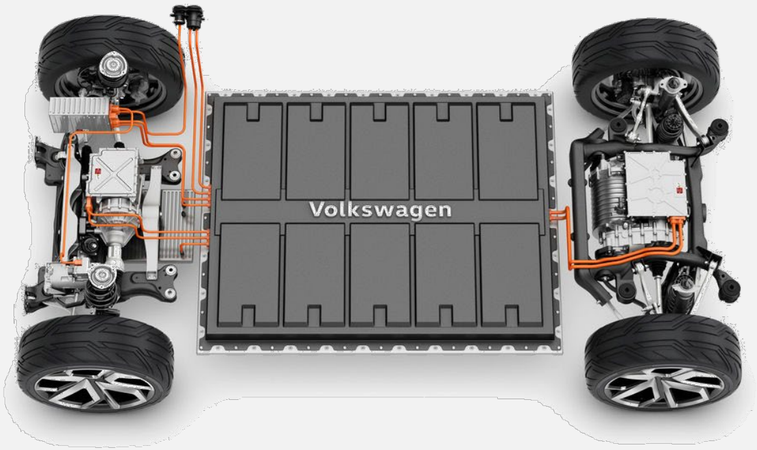
EXPANSION OF ELECTRIC VEHICLE CHOICE

RIVIAN'S MODULAR "SKATEBOARD" PLATFORM





VOLKSWAGEN GROUP'S MEB PLATFORM



Source: Rivian, Volkswagen

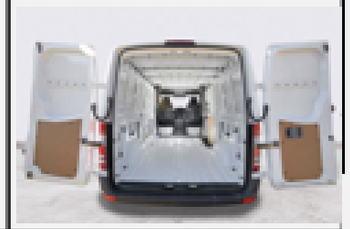
MORE LIGHT DUTY ELECTRIC VEHICLES

PASSENGER VEHICLES

SUVs

PICKUP TRUCKS

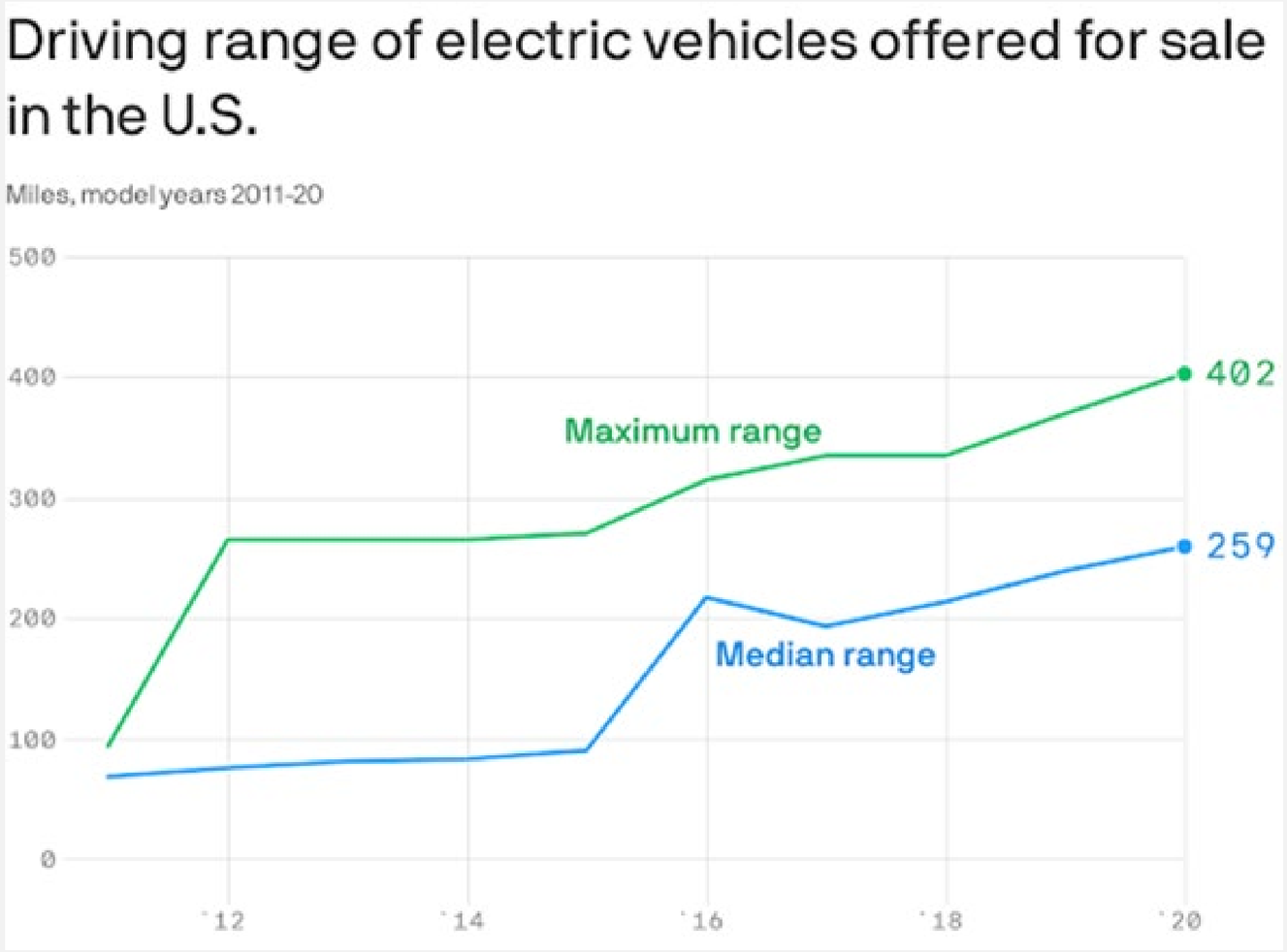
MORE MEDIUM AND HEAVY-DUTY VEHICLES

Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
	Envirotech Urban Truck 		GreenPower EV Star CarGOVan 	 BYD 6D Step Van	Kenworth K370E 	 Freightliner eCascadia116/ 126
Ford Transit		Lightning Systems Ford E-450				

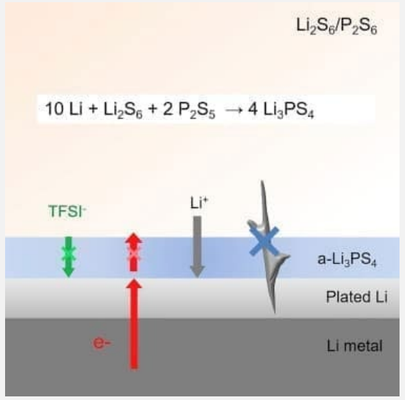
Island Region Vehicle Electrification Study

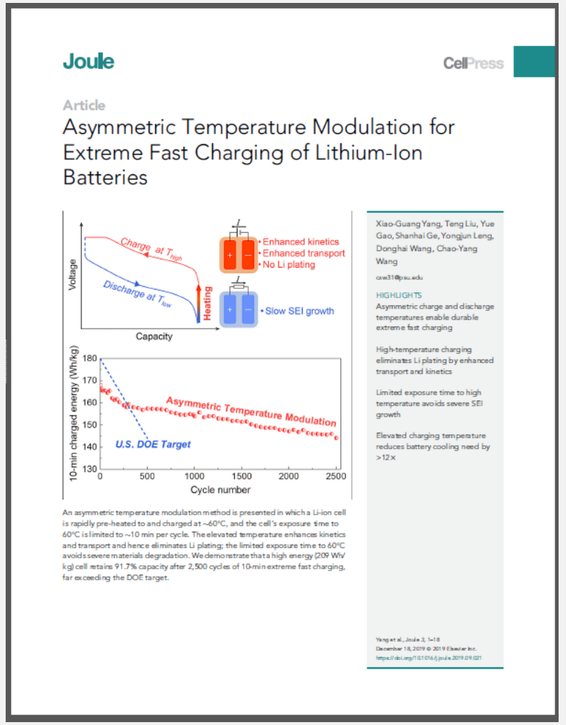
LOWER COST ENERGY STORAGE

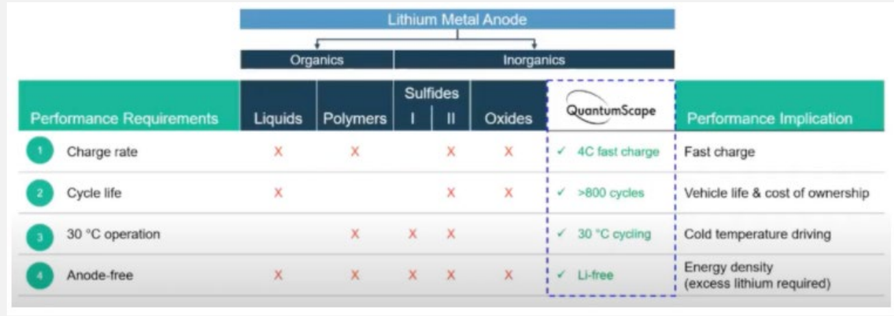
Lower battery cost = Longer drive range



BREAKTHROUGHS IN BATTERY TECHNOLOGY







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JON LESAGE

Jon LeSage is a California-based journalist covering clean vehicles, alternative energy, and economic and regulatory trends shaping the automotive, transportation, and mobility sectors.

More Info

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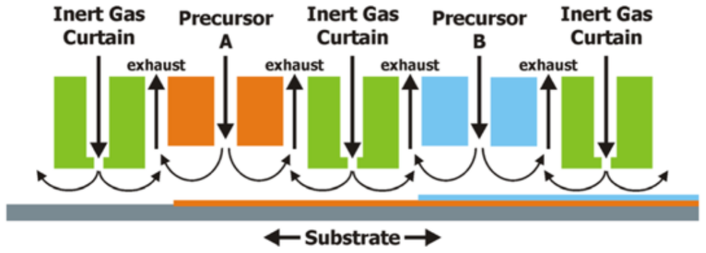
PREMIUM CONTENT

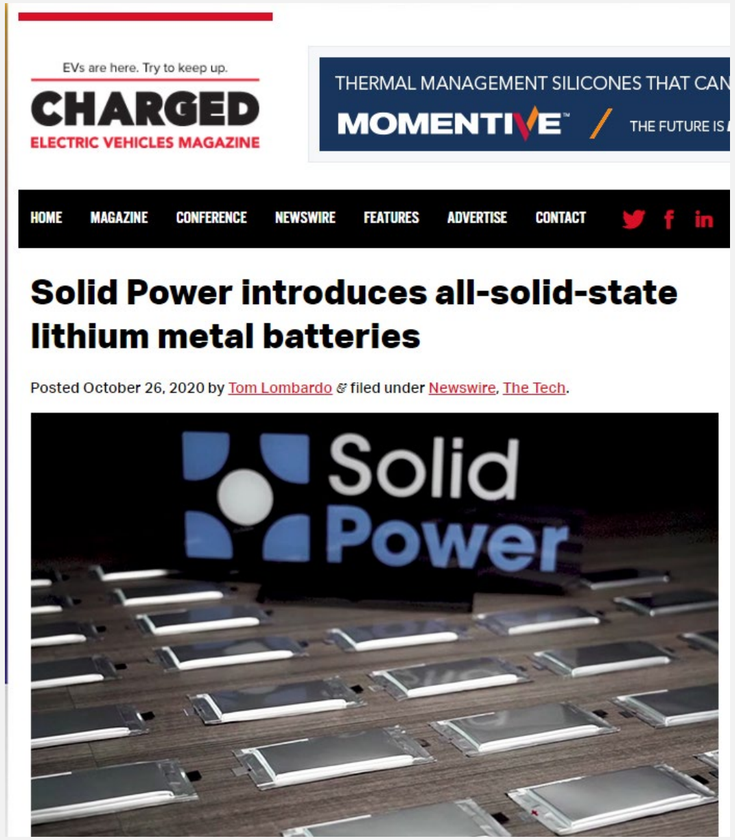
Solid State Batteries: The Next Big Thing In Electric Cars

By Jon LeSage - Jun 26, 2019, 12:00 PM CDT

Plug-in vehicle sales have been seeing sizable growth in recent years, with Tesla grabbing most of the attention. Now the race is on with Toyota and several other global automakers taking steps forward in being truly Tesla-competitive for the first time.

At 2.1 million sold worldwide last year, sales of battery-electric and plug-in hybrid electric vehicles only saw a peak moment of 3.8 percent of new vehicle sales in December — and only 2.2 percent of sales for the year. For that number to reach 10 percent or higher, they'll need to go 400 or more miles per charge and able to be recharged in about 10 minutes. That's still a long ways off, but Toyota, Jaguar, Audi, Volkswagen, and Porsche are





BIGGER CHARGERS FOR FASTER CHARGING

Modular charger architecture allows multiple power configurations and upgrades

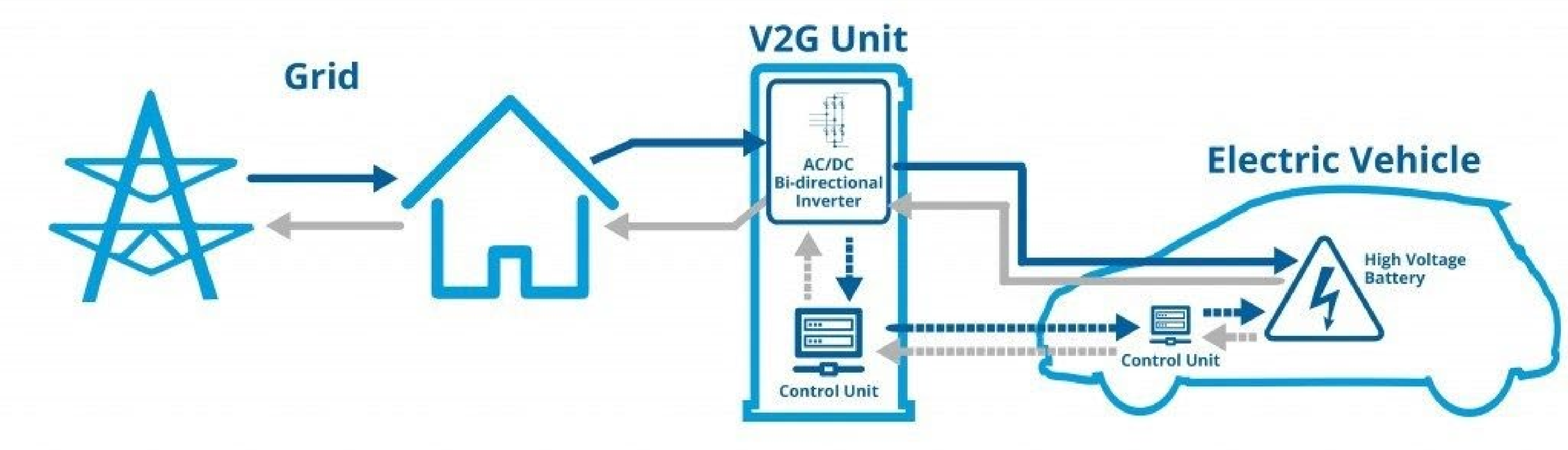
WIRELESS CHARGING

WiTricity

ROBOTIC CHARGING

Source: Volkswagen

VEHICLE TO GRID (V2G) CHARGING



PUBLIC OUTREACH SURVEY

NOVEMBER 3-30, 2020

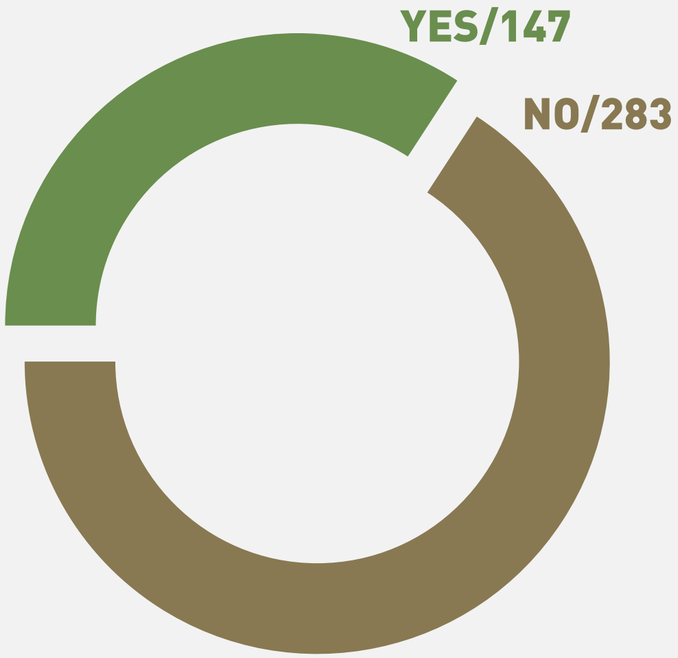
430

TOTAL RESPONSES

FAMILIARITY WITH ELECTRIC VEHICLES

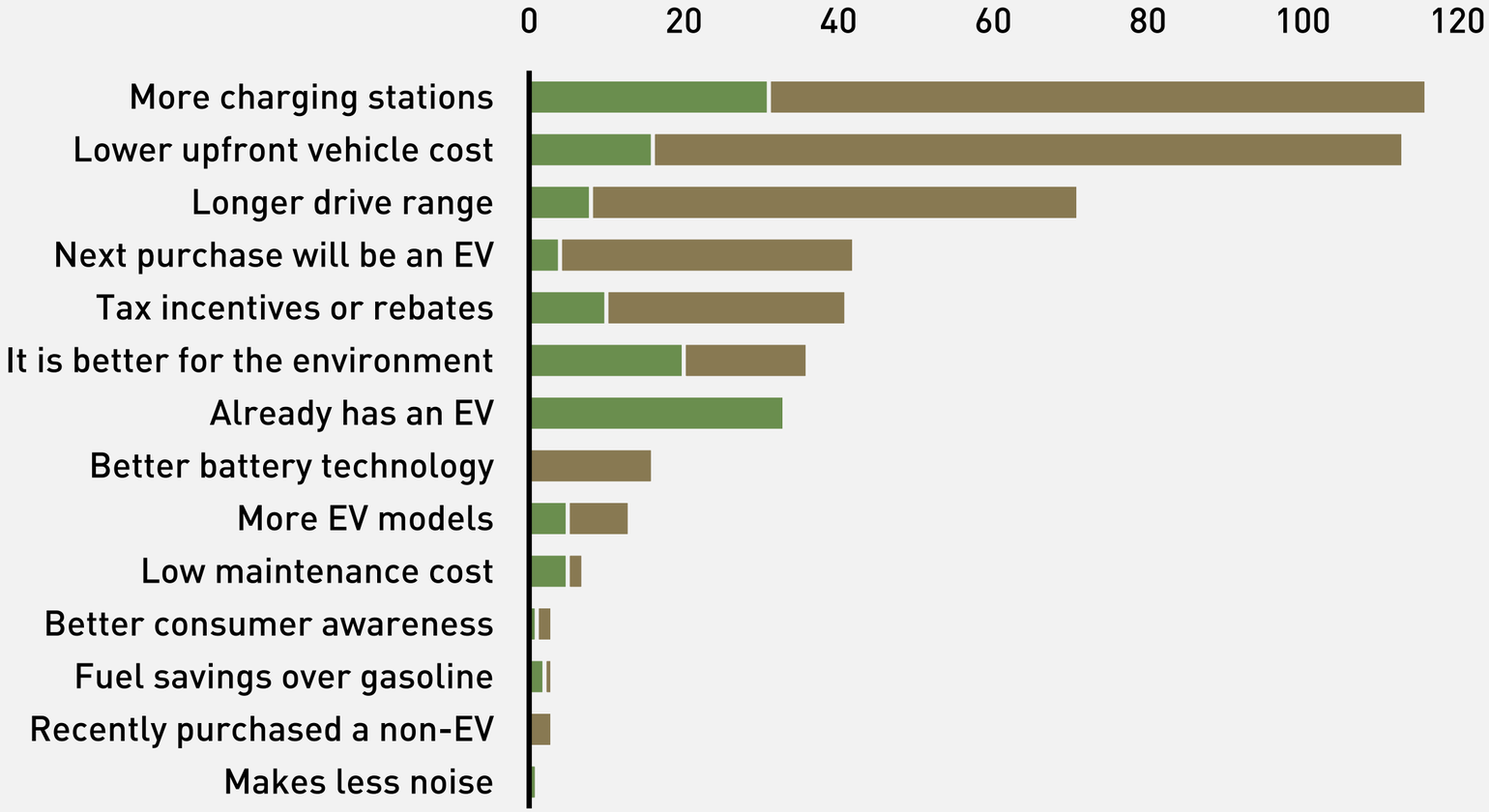
DO YOU OWN AN ELECTRIC VEHICLE?

100% response rate



WHAT WOULD ENCOURAGE YOU TO PURCHASE AN ELECTRIC VEHICLE?

90% response rate

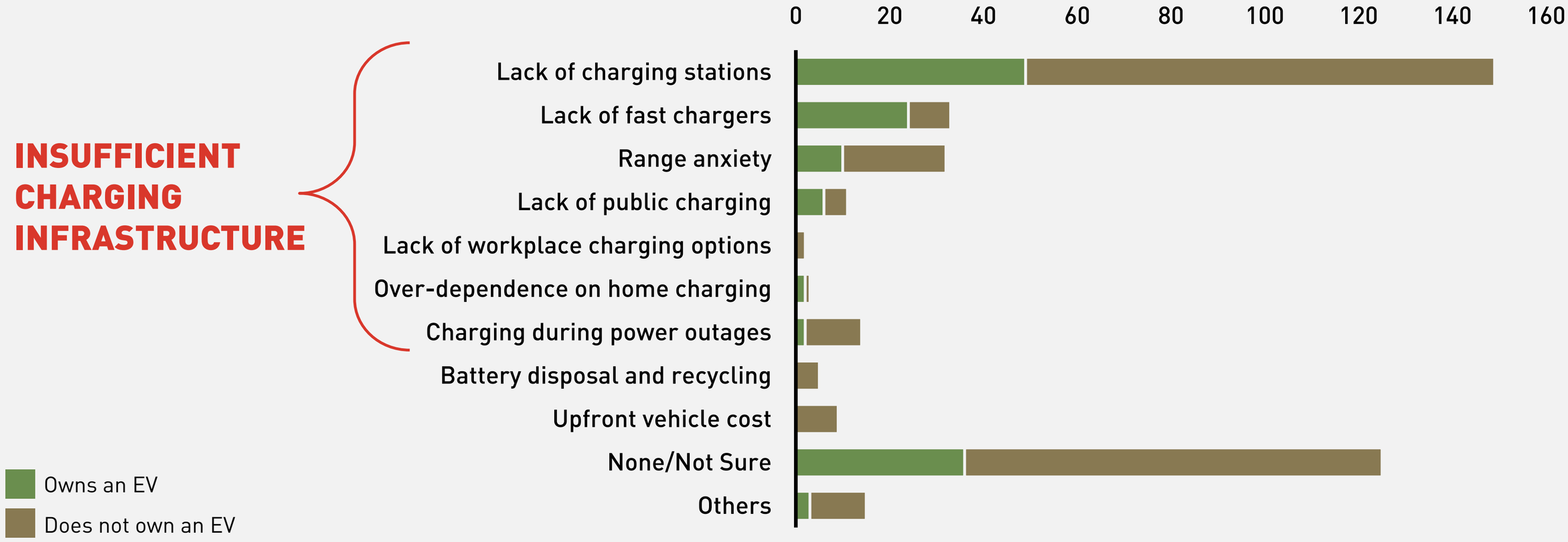


ELECTRIC VEHICLES ON ISLAND COUNTY

DO YOU SEE ANY UNIQUE CHALLENGES OF OWNING AN ELECTRIC VEHICLE ON WHIDBEY AND CAMANO ISLAND TODAY?

91% response rate

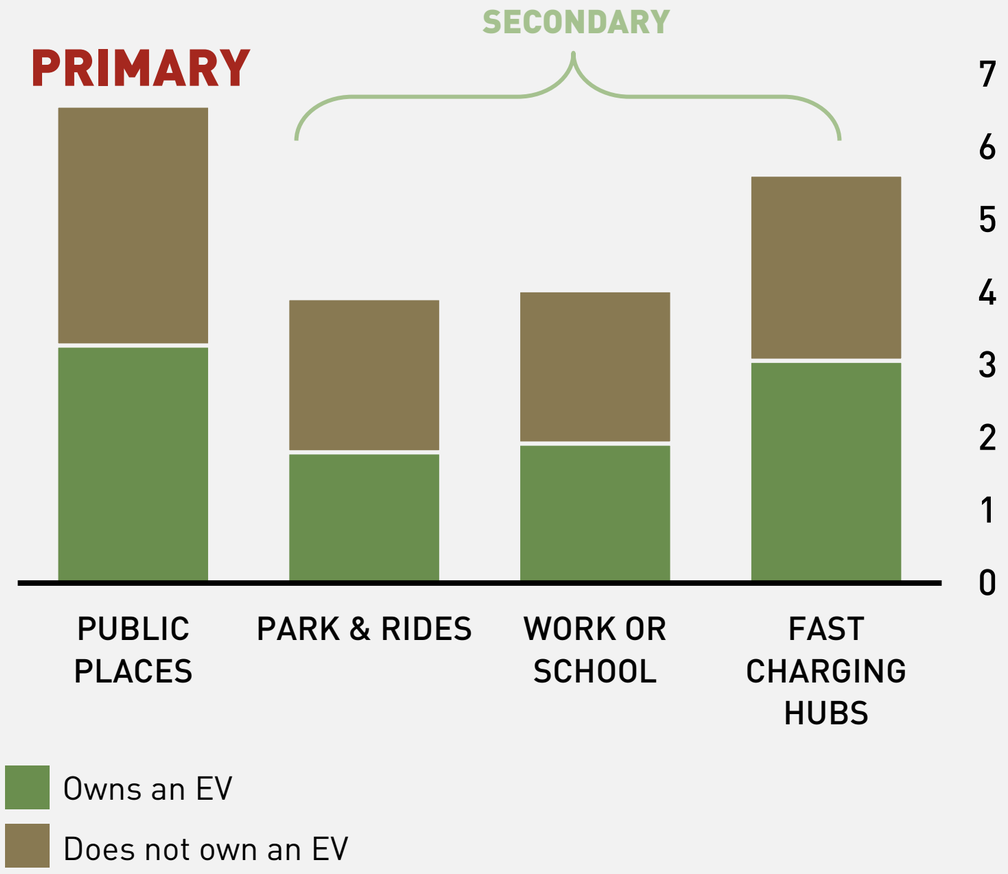
INSUFFICIENT CHARGING INFRASTRUCTURE



CHARGING STATIONS ON ISLAND COUNTY

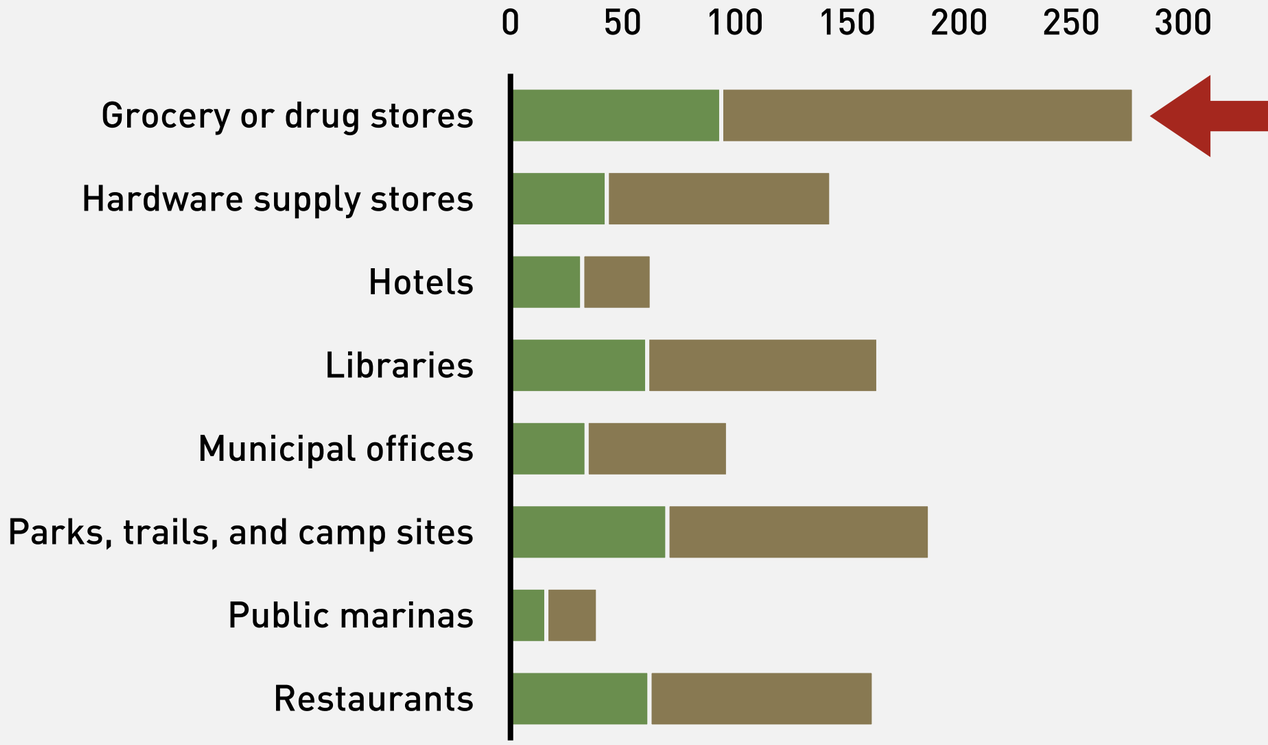
PREFERRED CHARGING LOCATIONS OUTSIDE HOME?

89% response rate



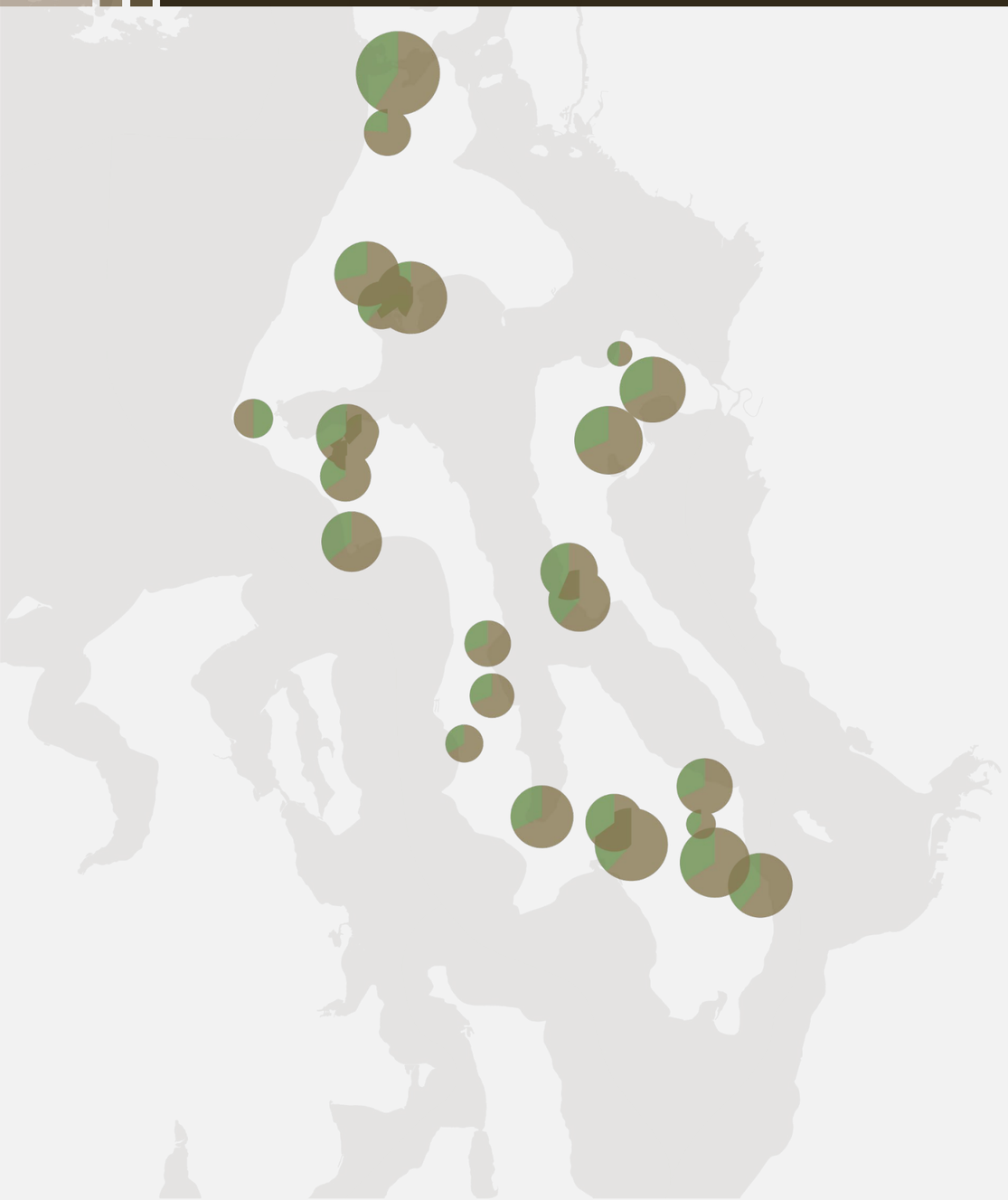
WHAT ARE YOUR PREFERRED PUBLIC CHARGING LOCATIONS?

94% response rate



WHERE ARE CHARGING STATIONS MOST NEEDED?

91% response rate



TOP 10

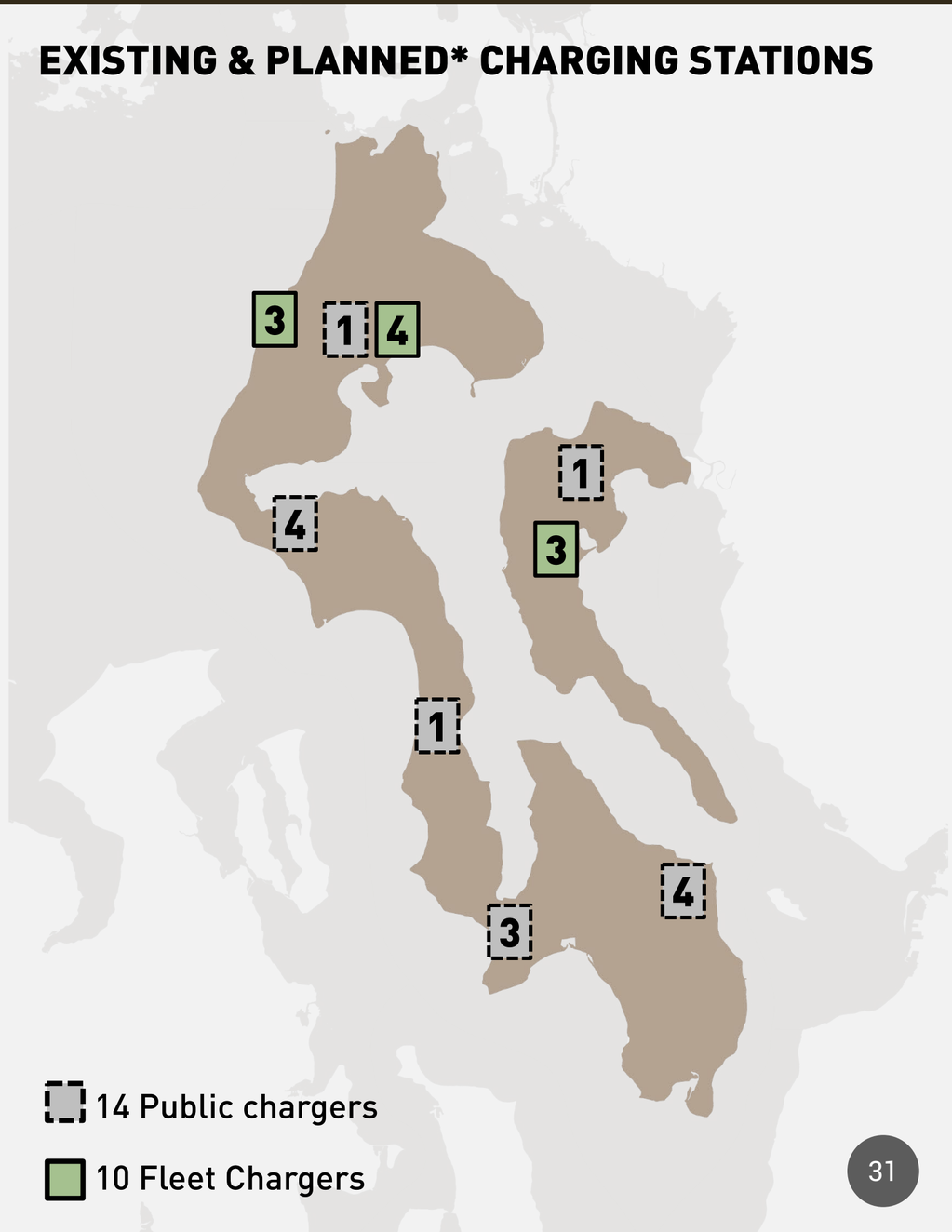
1. Deception Pass State Park
2. The Goose Community Grocer
3. Skagit College/Sno-Isle Library
4. Ken’s Corner
5. County Administrative Building
6. Terry’s Corner P&R
7. Oak Harbor P&R
8. Clinton P&R
9. Freeland P&R
10. Camano Island State Park

MAJOR TAKEAWAYS FROM SURVEY

- **Increasing acceptance of electric vehicles** among Island County residents for their positive climate effects and reduced fossil fuel reliance.
- **Lack of charging stations** on Island County was identified as the major concern, esp. at groceries, libraries, and parks
- **Upfront vehicle costs and lack of sufficient tax rebates and incentives** are the other key barriers to electric vehicle ownership.

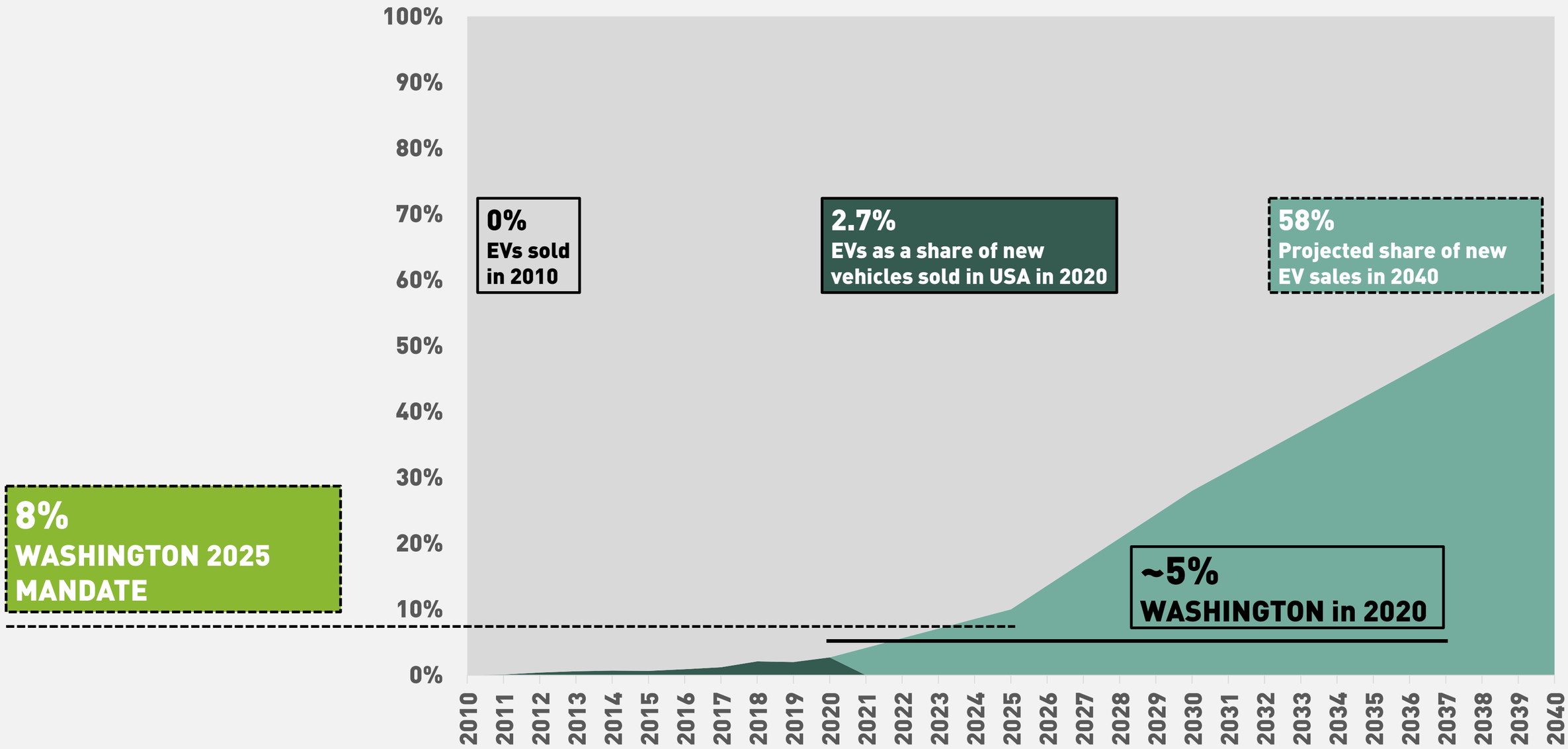
**includes chargers that are planned for installation with grant funds; Based on responses received from City of Oak Harbor, City of Langley, Town of Coupeville, Port of South Whidbey, Port of Coupeville, Island County, Island Transit, and NASWI*

EXISTING & PLANNED* CHARGING STATIONS



FLEET ELECTRIFICATION OPPORTUNITY

HOW COMMON ARE ELECTRIC VEHICLES IN WA?



Source: Dept. of Energy, Bloomberg NEF

ELECTRICITY VS GASOLINE

eGALLON

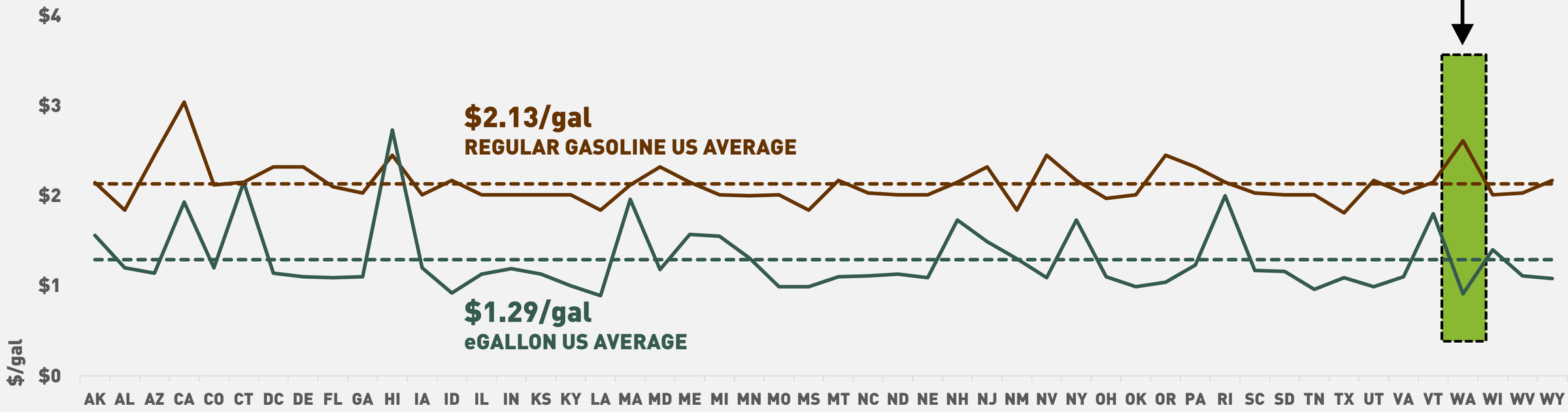
The cost of fueling a vehicle with electricity compared to a similar vehicle that runs on gasoline.

Calculation is based on EV rating/efficiency, fuel economy of a comparable gasoline-powered vehicle, and average statewide retail electricity rate.

WASHINGTON STATE
The cost of fueling a gas-powered vehicle is **3** times that of charging an electric vehicle

$2.61/gal
WASHINGTON STATE

$0.91/gal
WASHINGTON STATE



Source: Dept. of Energy; dated 12.19.2020

INCREASE IN BATTERY ELECTRIC VEHICLE MODELS

PASSENGER VEHICLES

*NON-FLEET PASSENGER VEHICLES

PATROL/PURSUIT VEHICLES

BUSES

PICKUP TRUCK AND CREW CABS

LARGE FLEET

PICKUP TRUCK WITH EQUIPMENT

FIREFIGHTING APPARATUS

MOTORCYCLE

2020

NISSAN LEAF
VOLKSWAGEN E-GOLF
CHEVROLET BOLT
HYUNDAI IONIQ
HYUNDAI KONA
KIA NIRO

*MINI ELECTRIC
*FIAT 500e
*TESLA MODEL 3
*BMW i3
*TESLA MODEL Y
*POLESTAR 1
*POLESTAR 2
*JAGUAR I-PACE
*AUDI E-TRON
*TESLA MODEL X
*PORSCHE TAYCAN

TESLA MODEL S

2021-2022

MAZDA MX-30
NISSAN ARIYA
VOLKSWAGEN ID.4
VOLVO XC40
KIA SOUL

TESLA MODEL Y
FORD MUSTANG MACH-E

PROTERRA ZX5 TRANSIT BUS
PROTERRA C2 SCHOOL BUS
BYD K9
NEW FLYER XCELSIOR CHARGE
GILLIG ELECTRIC BUS
LION C ELECTRIC SCHOOL BUS
LION M ELECTRIC MINIBUS

LORDSTOWN MOTORS ENDURANCE
FORD F150 ELECTRIC
FORD TRANSIT VAN ELECTRIC
TESLA CYBERTRUCK 40
RIVIAN R1T & R1S 70
NIKOLA BADGER

MOTIV PS
BYD CLASS 6, CLASS 8 TRUCKS
LION8 CLASS 8 TRUCK
NIKOLA REFUSE TRUCK
VOLVO FE ELECTRIC TRUCK
RENAULT DZE EV TRUCK

FREIGHTLINER EM2 BOX TRUCK
CHANJE V8100 MD TRUCK
RENAULT MASTER ZE BOX TRUCK

ROSENBAUER RT ELECTRICK TRUCK

ZERO SR/F
HARLEY DAVIDSON LIVEWIRE

FLEET ELECTRIFICATION OPPORTUNITY

	LOW OPPORTUNITY Fleet that presents a lower opportunity for near-term electrification	HIGH OPPORTUNITY Fleet that presents a higher opportunity for near-term electrification
VEHICLE AGE/USE	Vehicles that are less than 5 years old or low total miles driven	Older vehicles close to typical fleet replacement cycle or high total miles driven
DAILY MILEAGE	Low mileage vehicles (less than 25 miles per day)	High mileage vehicles (more than 25 miles per day)
MODEL AVAILABILITY	Vehicles that are not expected to have appropriate models soon	Vehicles that have or are expected to have appropriate models soon
EMERGENCY USE	Emergency use fleet	Non-emergency use fleet

FLEET OWNERSHIP & AGE

315

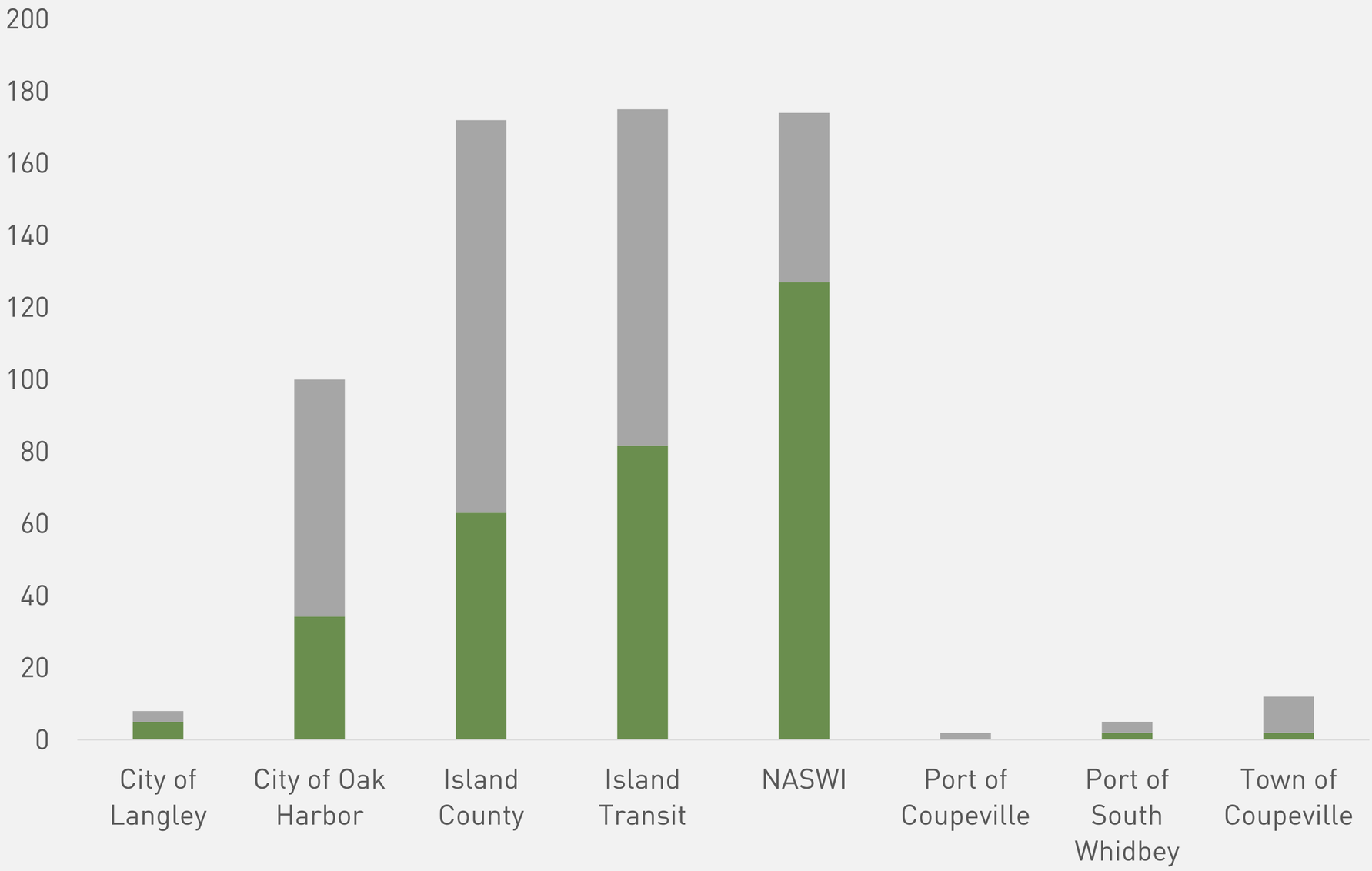
FLEET LESS THAN 5 YEARS OLD

333

FLEET MORE THAN 5 YEARS OLD

648

TOTAL FLEET

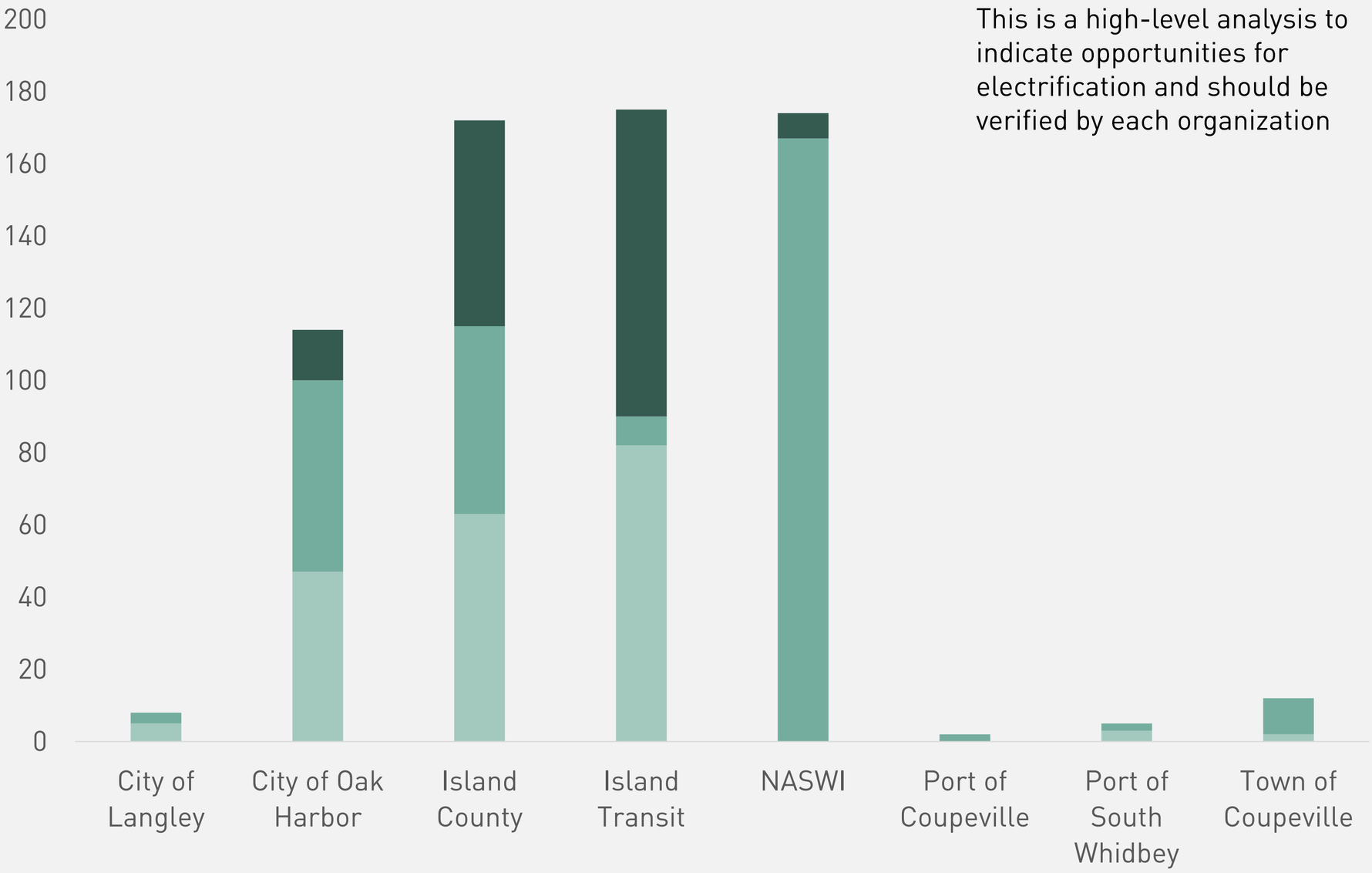


IRTPO FLEET ELECTRIFICATION OPPORTUNITY

163
HIGH

283
MEDIUM

202
LOW



This is a high-level analysis to indicate opportunities for electrification and should be verified by each organization

IRTPO POLICY

DRAFT

DRAFT IRTPO POLICY

The draft IRTPO policy supports:

Adoption of **plans to incrementally increase** the:

- Countywide proportion of private EV ownership
- Municipal EV fleet
- Proportion of EV buses

Advertisement to **increase public awareness** of existing financial incentives

Promoting workplace charging

Adoption of **initiatives and partnerships with electrical utilities and local businesses** to increase public charging station access

Adoption of **EV-ready building codes**

- Include language to standardize charging station design, minimum EV parking requirements, and ensure capacity for electrical infrastructure. Codes can be modelled after Town of Coupeville EV-codes

THANK YOU