

EVs: What You Need to Know

By
Paul Gipe



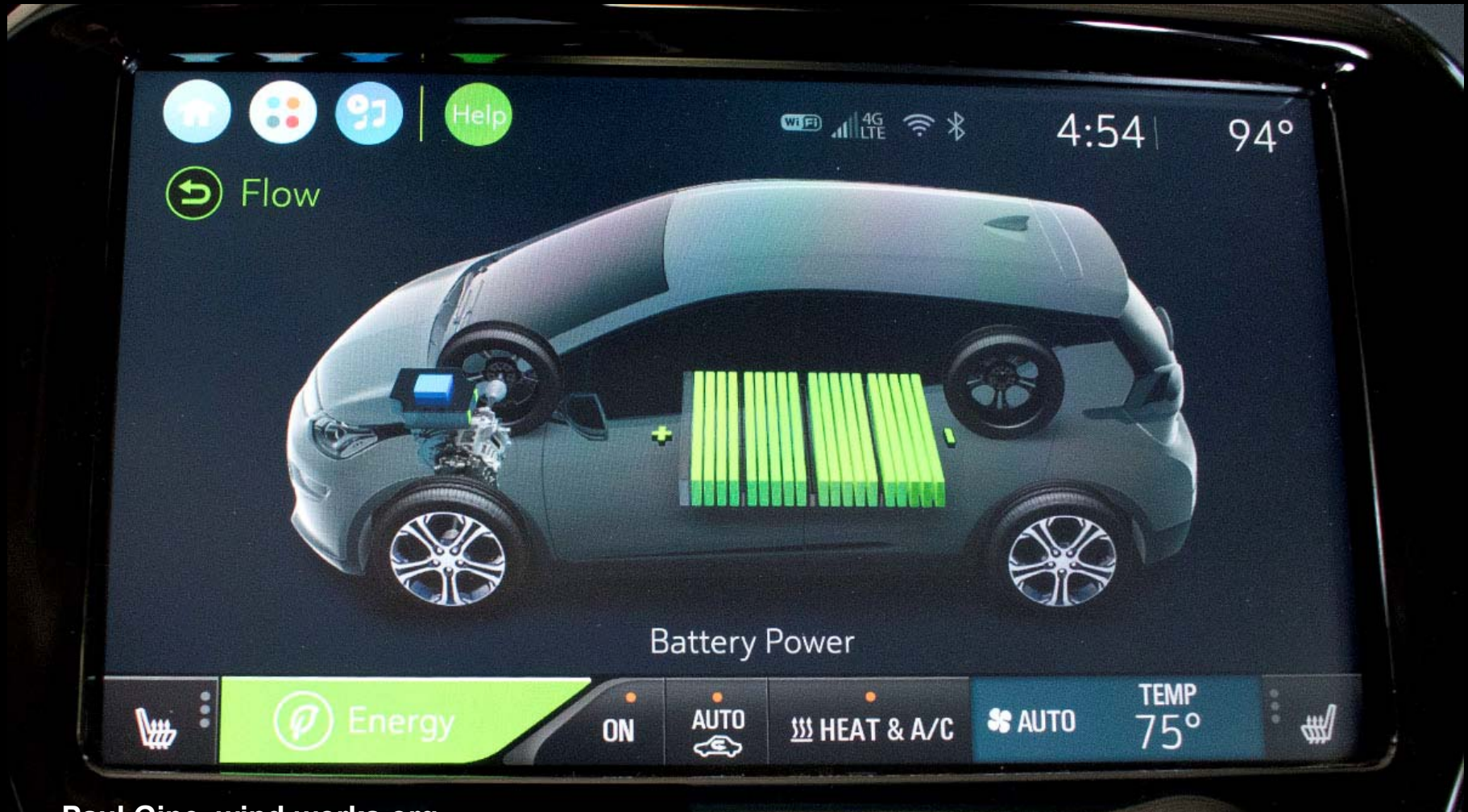
Bodie, California

EVs: What You Need to Know

- **EV**  **Car w/ Battery (BEV)**
- **Fuel**  **Electricity**
- **Fueling**  **Charging**
- **Engine**  **Motor**
- **Gearbox**  **Single-Speed**

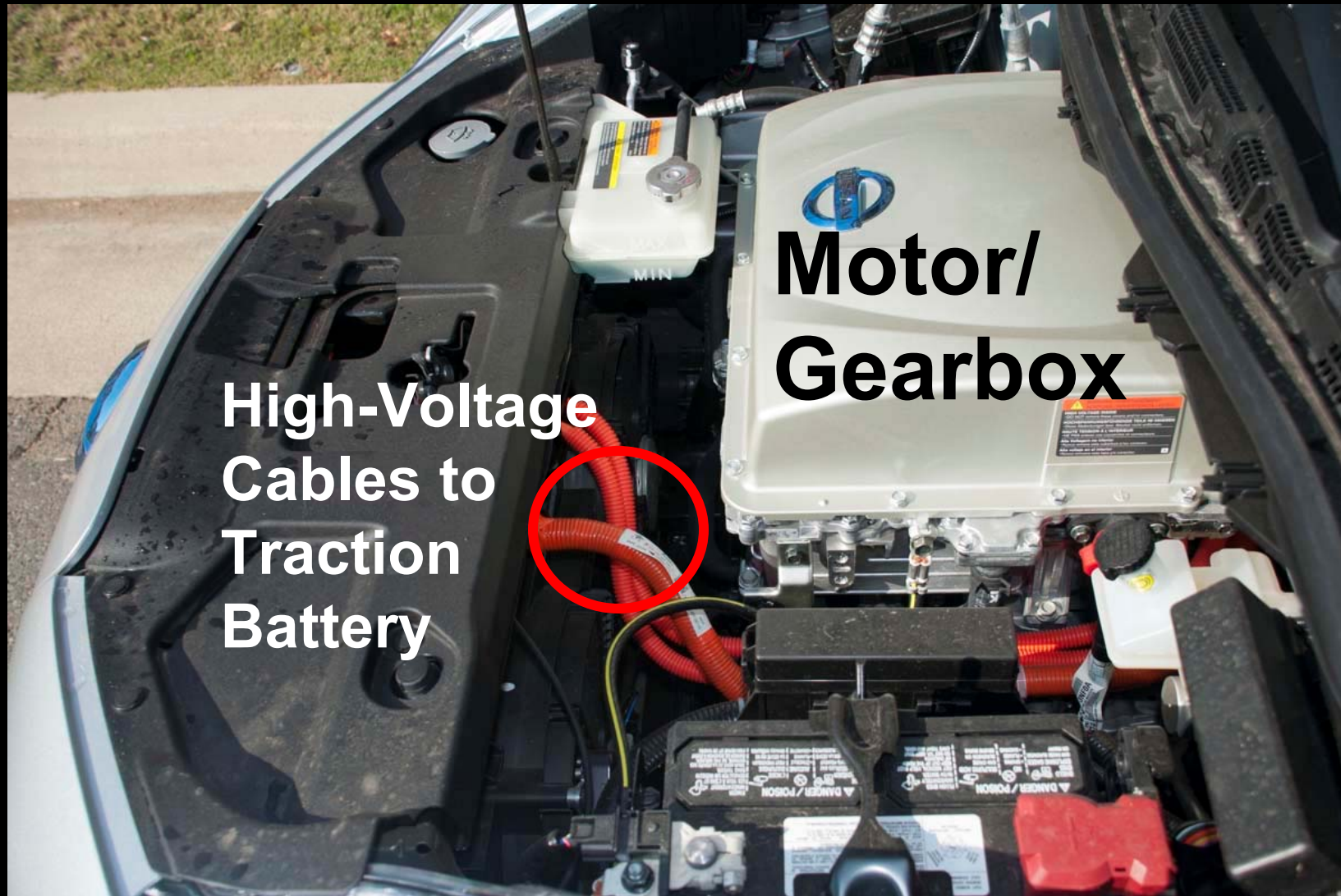
A BEV Has a Big Battery

Purpose-Built Traction Battery under the Floor & Seats



Paul Gipe, wind-works.org

A BEV Has a Motor



Fuel = Electricity

- Gallons  kWh
- Horsepower  kW
- Mpg  m/kWh

Charging Levels (How Fast)*

- **Level 1: 120 V (Takes Forever)**
Forgettaboutit!!!!
- **Level 2: 240 V (Overnight)**
Home & Destination (Hotels)
- **DCFC: 400-1,000 V**
A Matter of Minutes

***90% of Charging is Done at Home.**

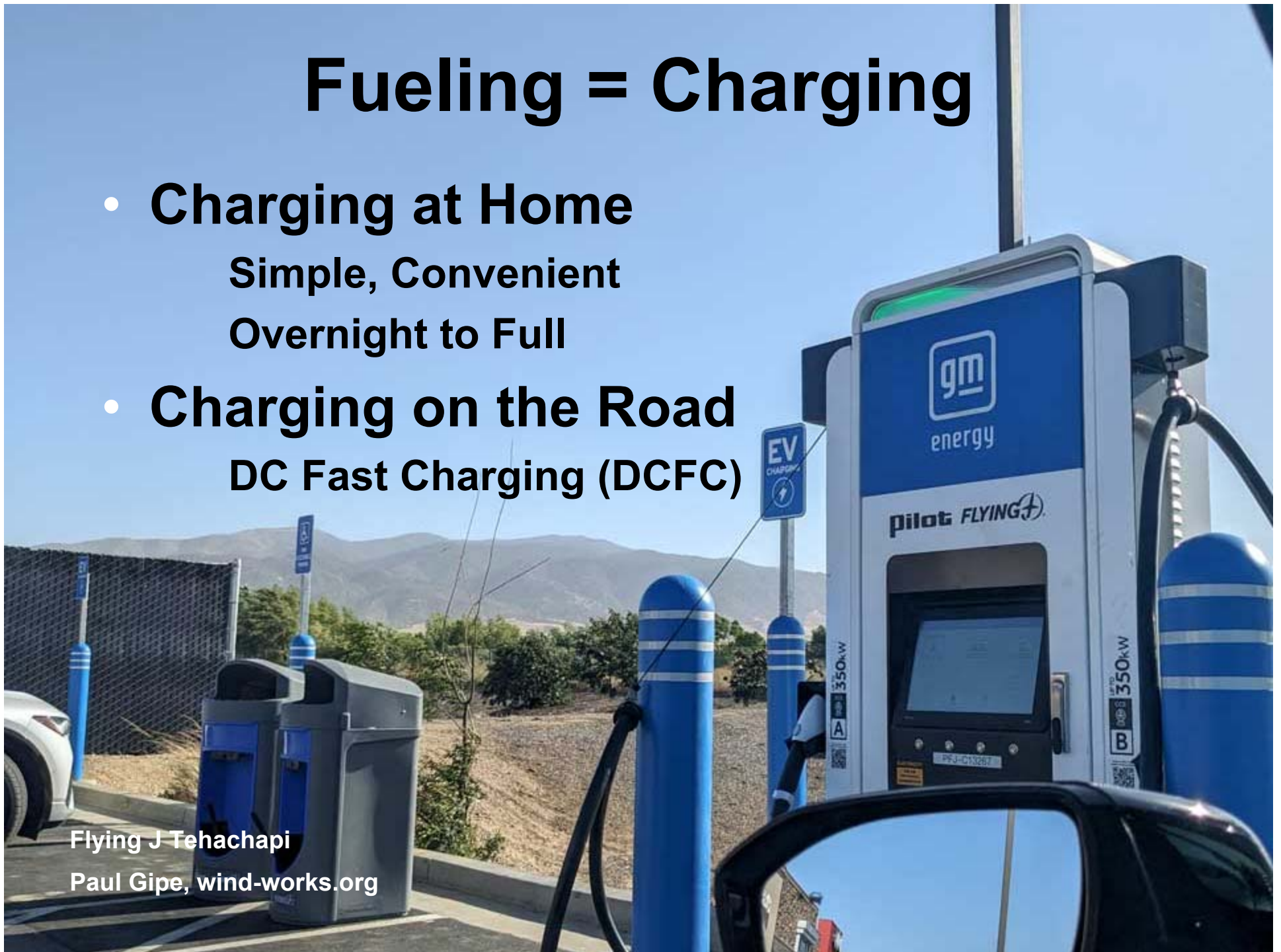
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Fueling = Charging

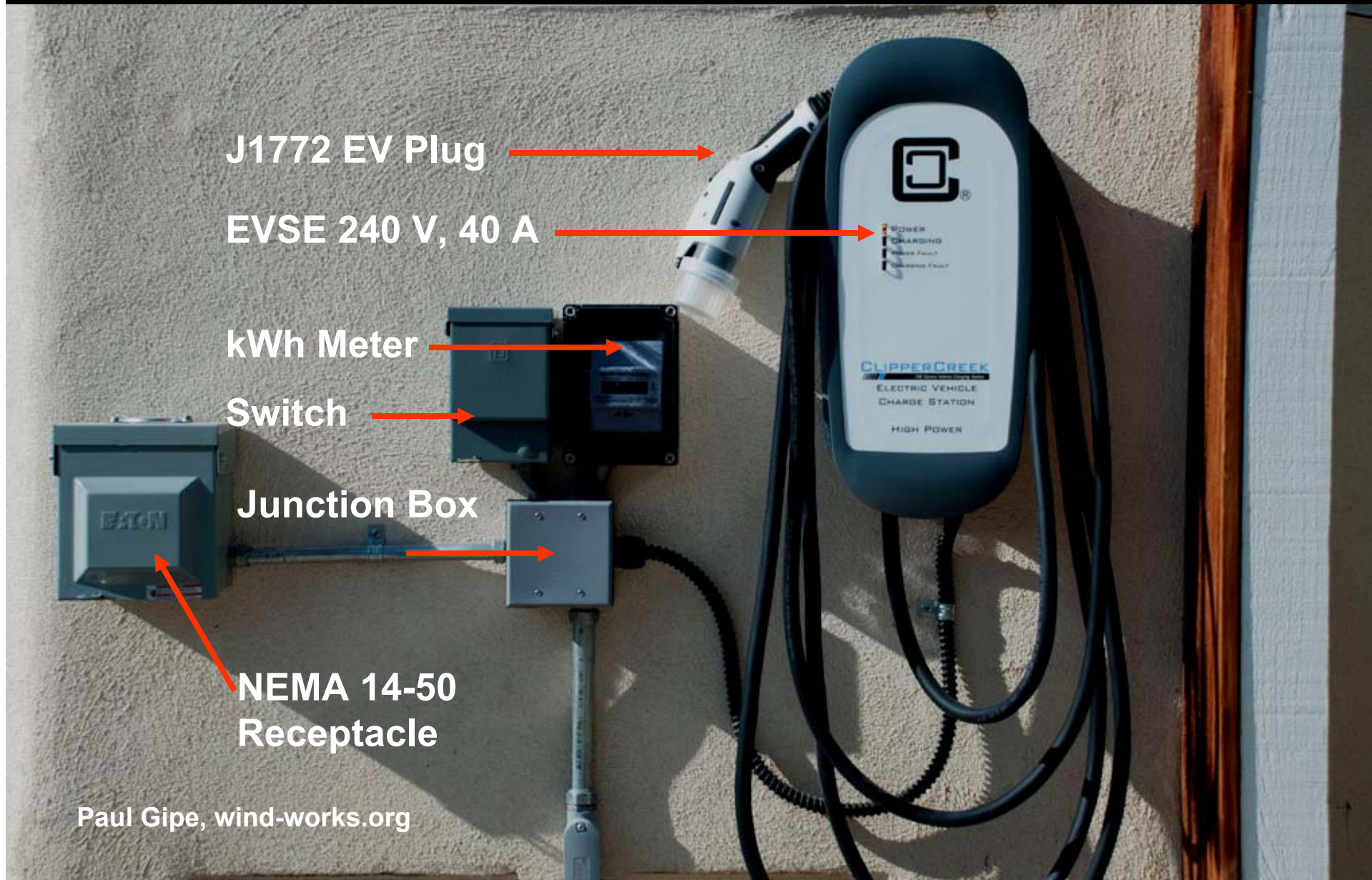
- **Charging at Home**
Simple, Convenient
Overnight to Full
- **Charging on the Road**
DC Fast Charging (DCFC)

Flying J Tehachapi

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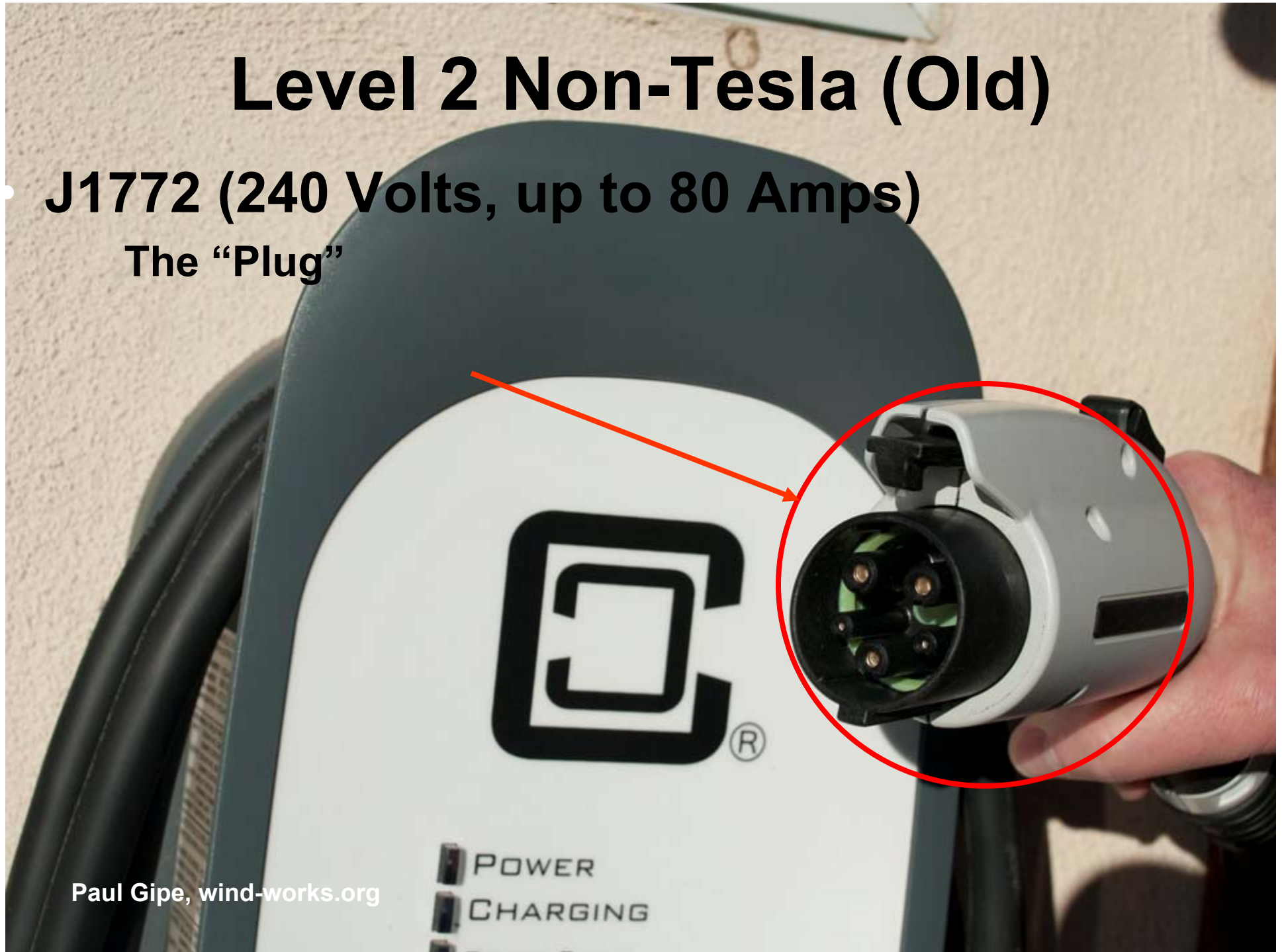
EV Home Charge Station



Level 2 Non-Tesla (Old)

J1772 (240 Volts, up to 80 Amps)

The “Plug”



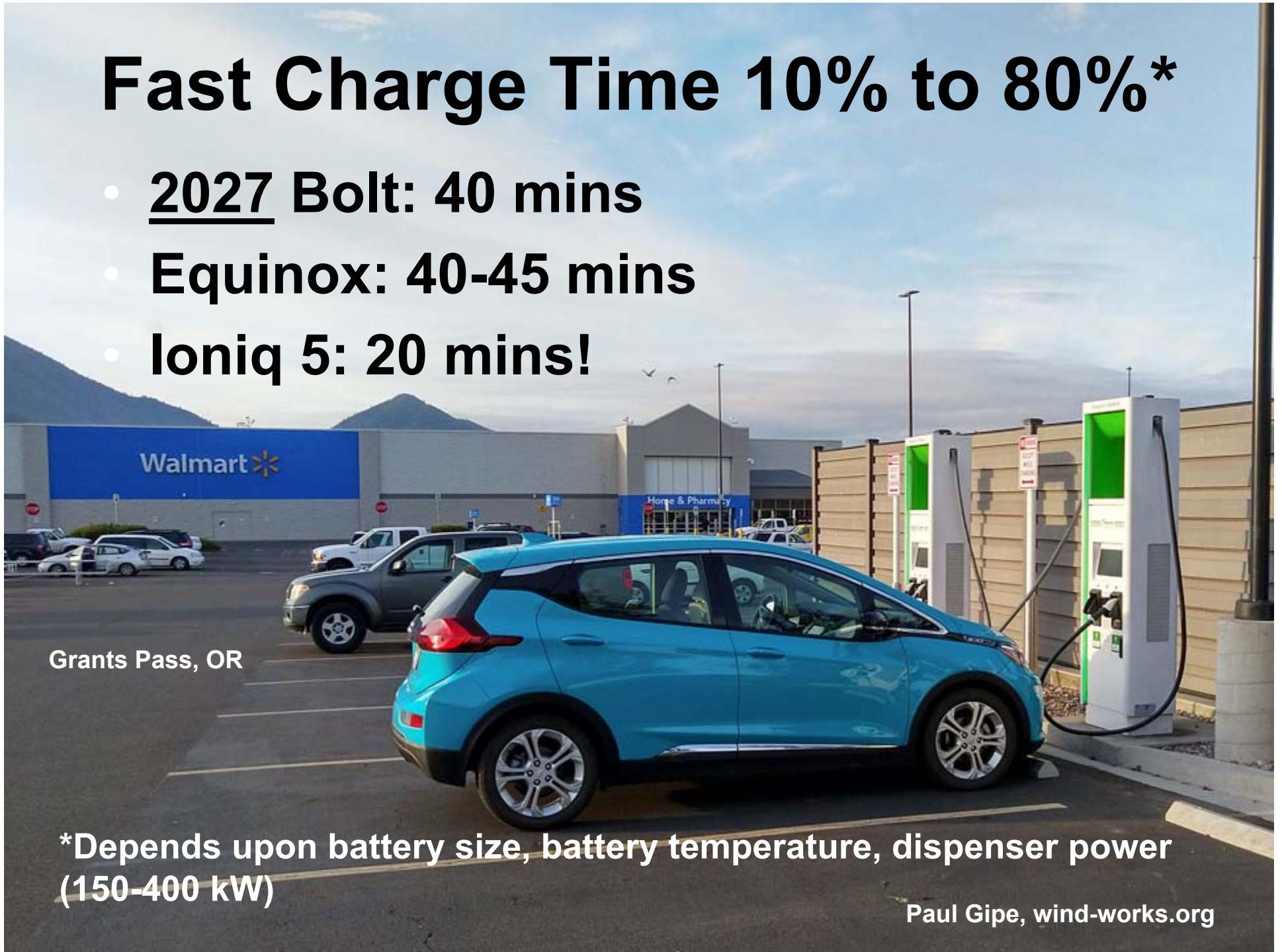
Fast Charge Time 10% to 80%*

- 2027 Bolt: 40 mins
- Equinox: 40-45 mins
- Ioniq 5: 20 mins!

Grants Pass, OR

*Depends upon battery size, battery temperature, dispenser power (150-400 kW)

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DCFC Stations & Stalls

- Station = Group of Dispensers
- Dispenser (1-2 Cables = 1-2 Stalls)
- Tesla Superchargers
- CCS + ~~CHAdemo~~
- ~~CHAdemo Only~~
Old Leaf



DCFC Charge Station

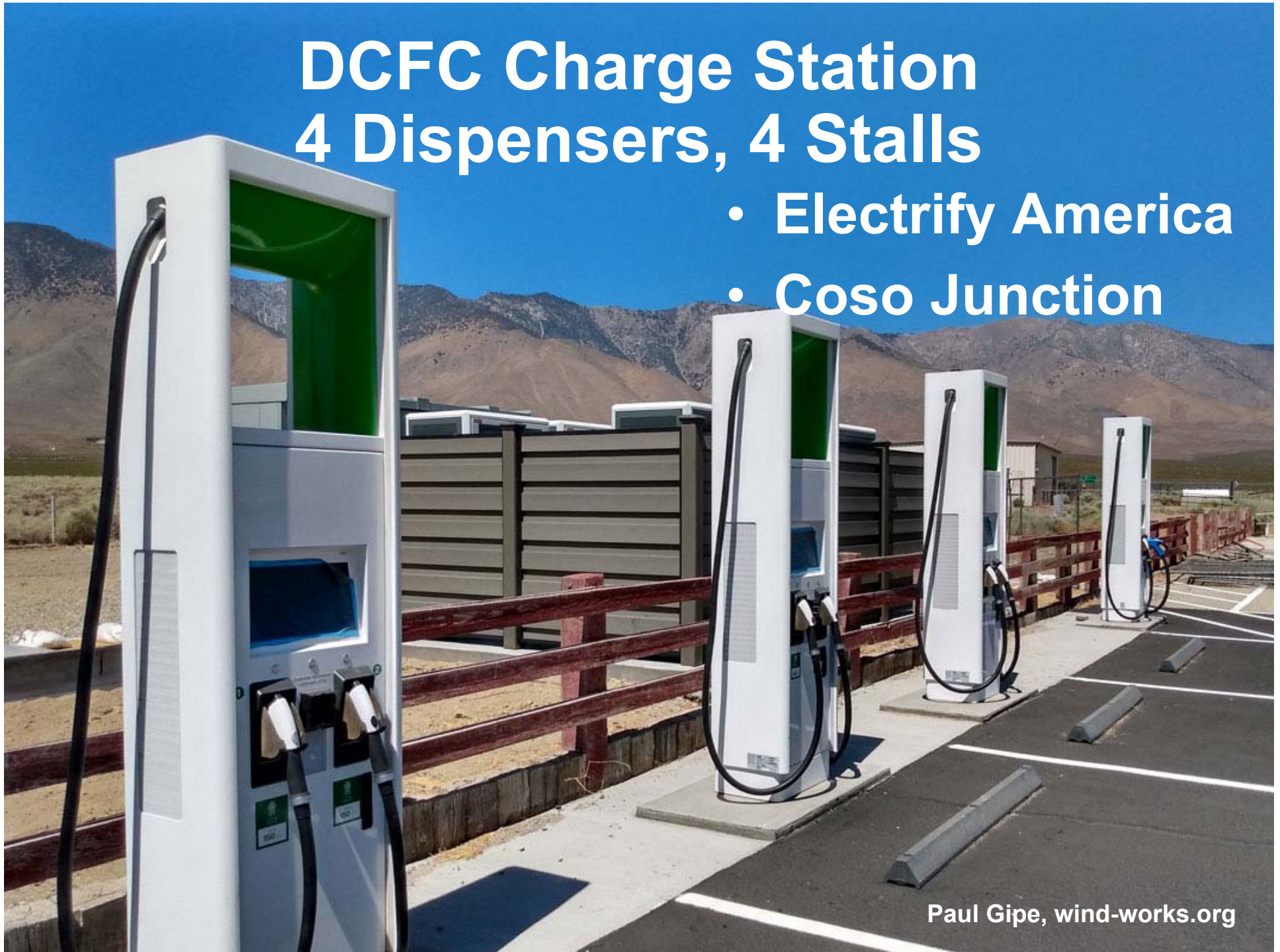
3 Dispensers, 3 Stalls



- ChargePoint
- Coalinga (I-5)

DCFC Charge Station 4 Dispensers, 4 Stalls

- Electrify America
- Coso Junction



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DCFC Charge Station

6 Dispensers, 6 Stalls

- Prunedale (101)
- Becoming More Common



Tesla Superchargers

Multiple Dispensers, Many Stalls

- **I-5 Harris Ranch**
- **80 Stalls**
- **Open to Non Teslas**
Requires Adapter

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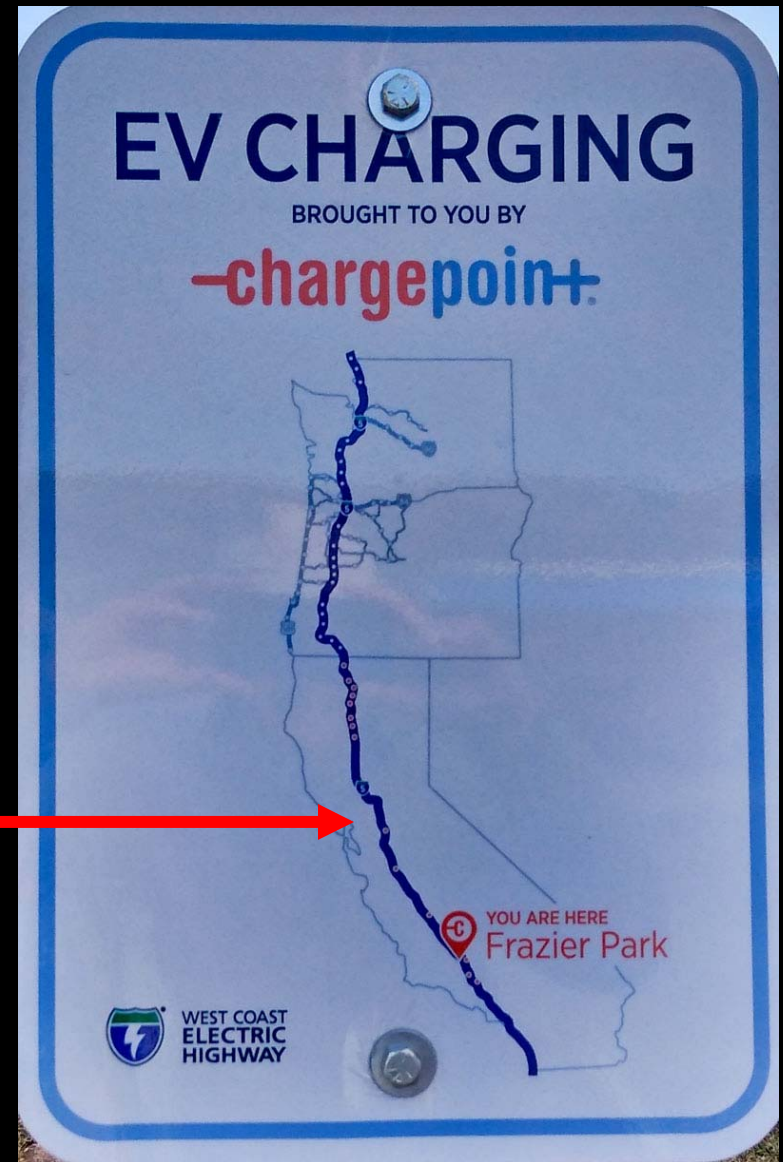
Tesla Supercharger Lost Hills, 84 Stalls

- I-5
- Open to Non Tesla
Requires Adapter

DCFC Stations Growing Rapidly

- **Private Networks**
Tesla, EA, EVgo, etc.
- **CEC Program**
- **Federal Program**
NEVI

West Coast Electric Highway



California DCFC Stations 2025



EN



Search for a Charging Location

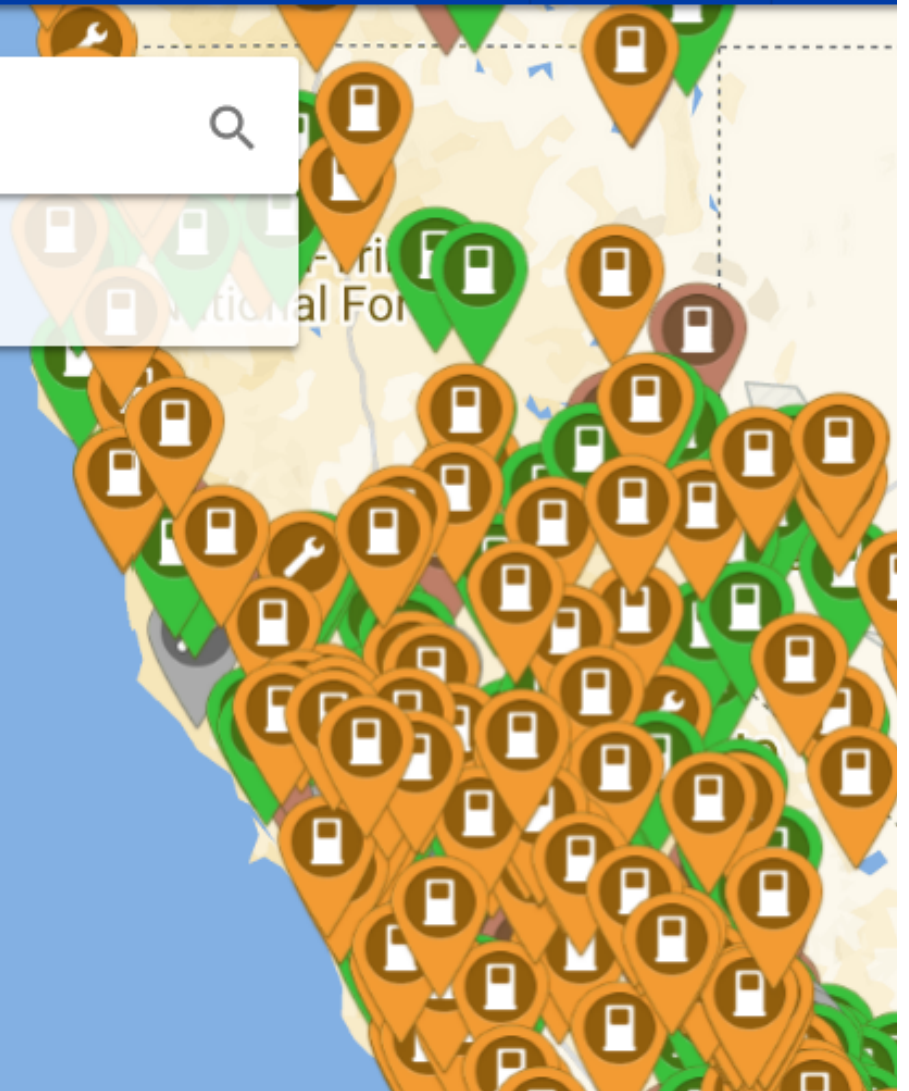


3 Plugs

47+ Networks

- **2,500 DCFC Stations**
16,000 Ports (Plugs)
~6 Ports/Station

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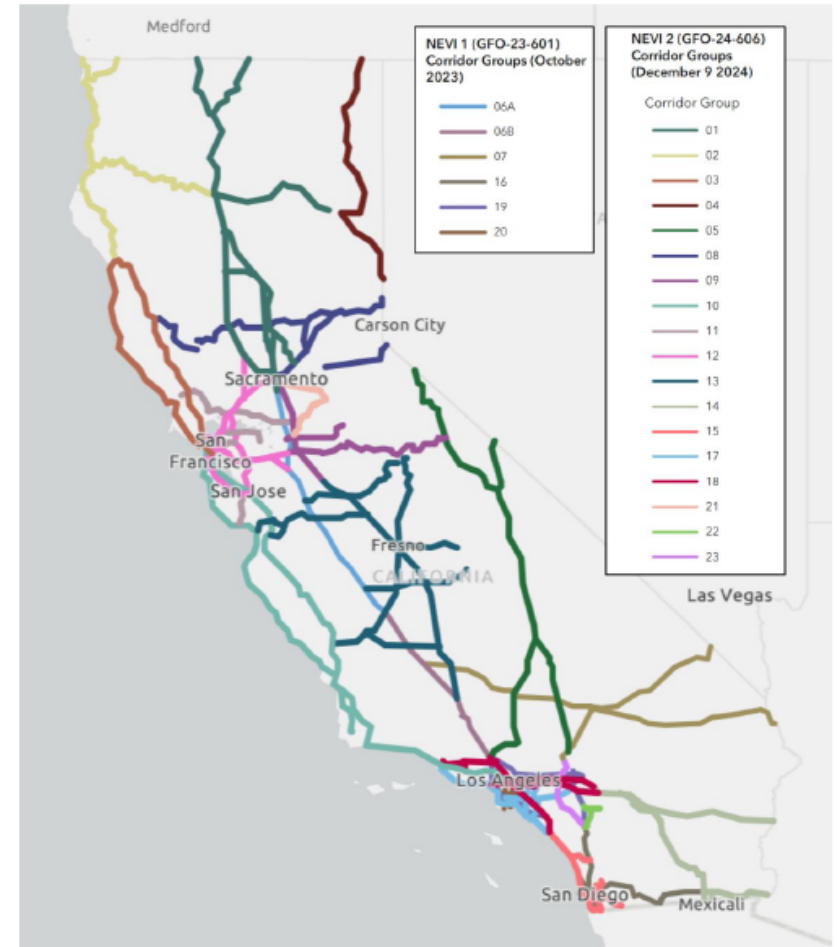
California NEVI Corridors

- **240 Stations**
1,300 ports
Already Awarded
- **3 More Rounds**
2025-2027
- **Total 500+ Stations**
- **Total 3,000+ Ports**

National EV Infrastructure Program

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Figure 1: California's 23 NEVI Corridor Groups



Source: CEC Staff using the NEVI Program Map [California's NEVI Program Map](#)

Charging Plugs—In Transition

- **Tesla: Level 2 & DCFC**
- **GM, Ford, all others**
J1772 (Level 2), CCS1 (DCFC)
- **NACS**
North American Charging Standard
~Tesla Plug for All New Cars

Tesla Level 2, Fresno



Tesla Plug = NACS

- Will become Universal
- Will Replace CCS1 DCFC
- Will Replace Level 2 (J1772)
- Used Cars:

Tesla & J1772 + CCS1
Confused Yet?



Tesla (NACS) to CCS/J1772 Adapters

Tesla to CCS (DCFC)



Lectron Bundle ~\$300



Tesla to J1772 (Level 2)
Destination Charging



Modern Charging Networks—The Future of Fast Charging?

- Toilets, Lounge, Vending, WiFi
- IONNA (GM, Ford, etc)
- Rivian Outpost
- ~BP Pulse, Pilot/Flying J

Where EV Charging Meets Hospitality.

Leave your car. Relax inside. Get back on the road refreshed.

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DCFC: Ionna in California

- \$250 million 2025-2029
- 1,000 New Stalls
- Plug & PLayer
Autocharge
Plug & Charge
- Inyokern!

Ionna, Ashland, Oregon 2025

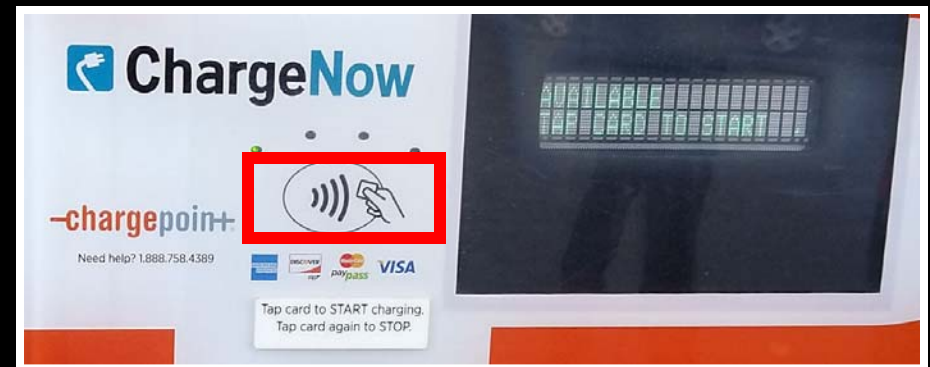


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EV Road Tripping: How do You Pay

- **Credit Card**
California & NEVI Req'd.
Don't Always Work
- **Apps**
Cumbersome
- **RFID Cards**
Nearly Always Work
Or Smart Phone
- **Plug & Charge**
Works!

RFID Cards & Reader



The Future of Fast Charging —No Apps, No Cards

- **EVgo Autocharge**
(Older Cars)
Bolt, Kona, etc
- **Plug & Charge**
New Cars
Equinox, F150, Mach E
Plug-in, Charge, & Go



Apps. . . & More Apps

- **PlugShare.com**
- **Charge Networks**
- **Company (GM, Ford, etc)**
- **ABRP (Trip Planning)**
- **Car Play, Android Auto**
- **Enough Already!!!**

App Fatigue

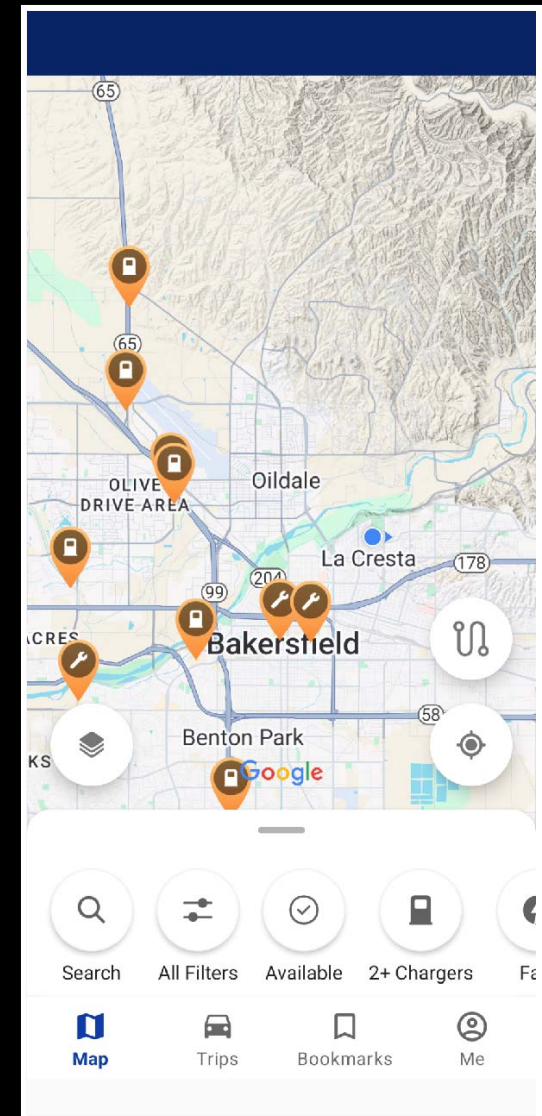
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EV Road Tripping: Do You Need a Smart Phone?

- No, But it Helps
- Can't Access PlugShare
When You Need it
You Need it

PlugShare app, Bakersfield, CA



EV Road Tripping: Do You Need a Smart Phone?

- **CC Readers Req'd. in California**

Outside California?

NEVI Sites, Yes

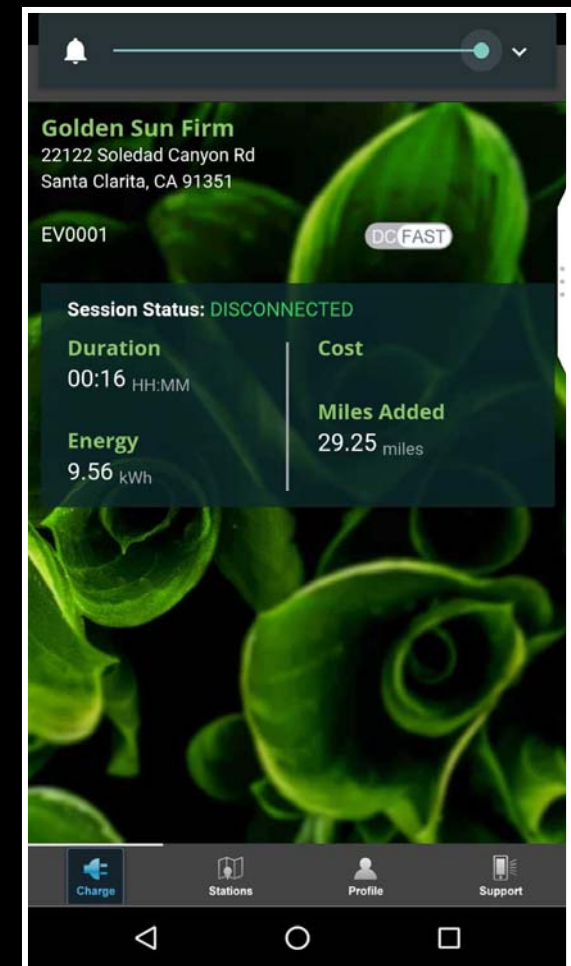
- **Older Cars**

No Route Planning

Need ABRP

- **New Cars**

Native Route Planning



EV Road Tripping: What to Know Before You Go

- **Know How to Use**
PlugShare
Navigation Apps
ABRP for Older Cars
- **Practice**
Before You Go!



Grants Pass, OR

EV Road Tripping: Be Persistent!

Charging Failure

- Don't Give up
on First Try
- Try All Options
CC, RFID, App
Move to Another Stall
Repeat
- Yes, Call Support
They Often Get it to Work
But not Always ;)



Call for Support

PlugShare DCFC

PlugShare

EN Paul Gipe's Profile Chevrolet Bolt EV

Search for a Charging Location

Plugs (2 of 8) Toggle All

Reset plugs to match vehicle defaults

CCS1 ✓

J-1772

Wall

More - Plugs may require an adapter

NACS (Tesla) ✓

CHAdMO

Tesla (Roadster)

Set Your Filters

Map showing charging locations (red circles) near Ridgecrest, Bradys, and Searles Valley.

EV Road Tripping: Destination Charging

- **Pick Hotels w/ Charging**
- **Filter Search for Charging**

J1772, NACS

- **Wake up w/ Full Tank**

Granzella's Inn, Williams, Calif.

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PlugShare Level 2 Destination Charging (Hotels)

The screenshot displays the PlugShare app interface. At the top, the PlugShare logo is on the left, and the language is set to 'EN'. On the right, there is a user profile for 'Paul Gipe's Profile' and a partial view of another profile. Below the header, a search bar prompts the user to 'Search for a Charging Location'. A filter panel on the left, titled 'Plugs (2 of 8)', allows users to select charging standards. It includes a 'Toggle All' button and a 'Reset plugs to match vehicle defaults' option. The selected filters are 'J-1772' and 'NACS (Tesla)', both highlighted with red circles. Other visible options include 'CCS1', 'Wall', 'CHAdemo', and 'Tesla (Roadster)'. A note states 'More - Plugs may require an adapter'. To the right of the filter panel, a map titled 'Set Your Filters' shows the area around China Lake, CA. Several charging locations are marked with icons: a green icon for 'Ridgecrest' (circled in red), a brown icon for 'Hampton Inn & Suites Ridgecrest' (circled in red), and a green icon for 'Maturango Museum' (circled in red). Other landmarks visible on the map include 'Naval Air Weapons Station China Lake', 'Ridgecrest DMV', 'Ridgecrest Medical Transportation', 'Walmart Supercenter', and 'Ridgecrest Landfill'.

PlugShare

EN

Paul Gipe's Profile

Search for a Charging Location

Plugs (2 of 8)

Toggle All

Reset plugs to match vehicle defaults

CCS1

J-1772

Wall

More - Plugs may require an adapter

NACS (Tesla)

CHAdemo

Tesla (Roadster)

Set Your Filters

Naval Air Weapons Station China Lake

Ridgecrest DMV

Hampton Inn & Suites Ridgecrest

Maturango Museum

W Las Flores Ave

Ridgecrest Medical Transportation

Ridgecrest Blvd

E Ridgecrest Blvd

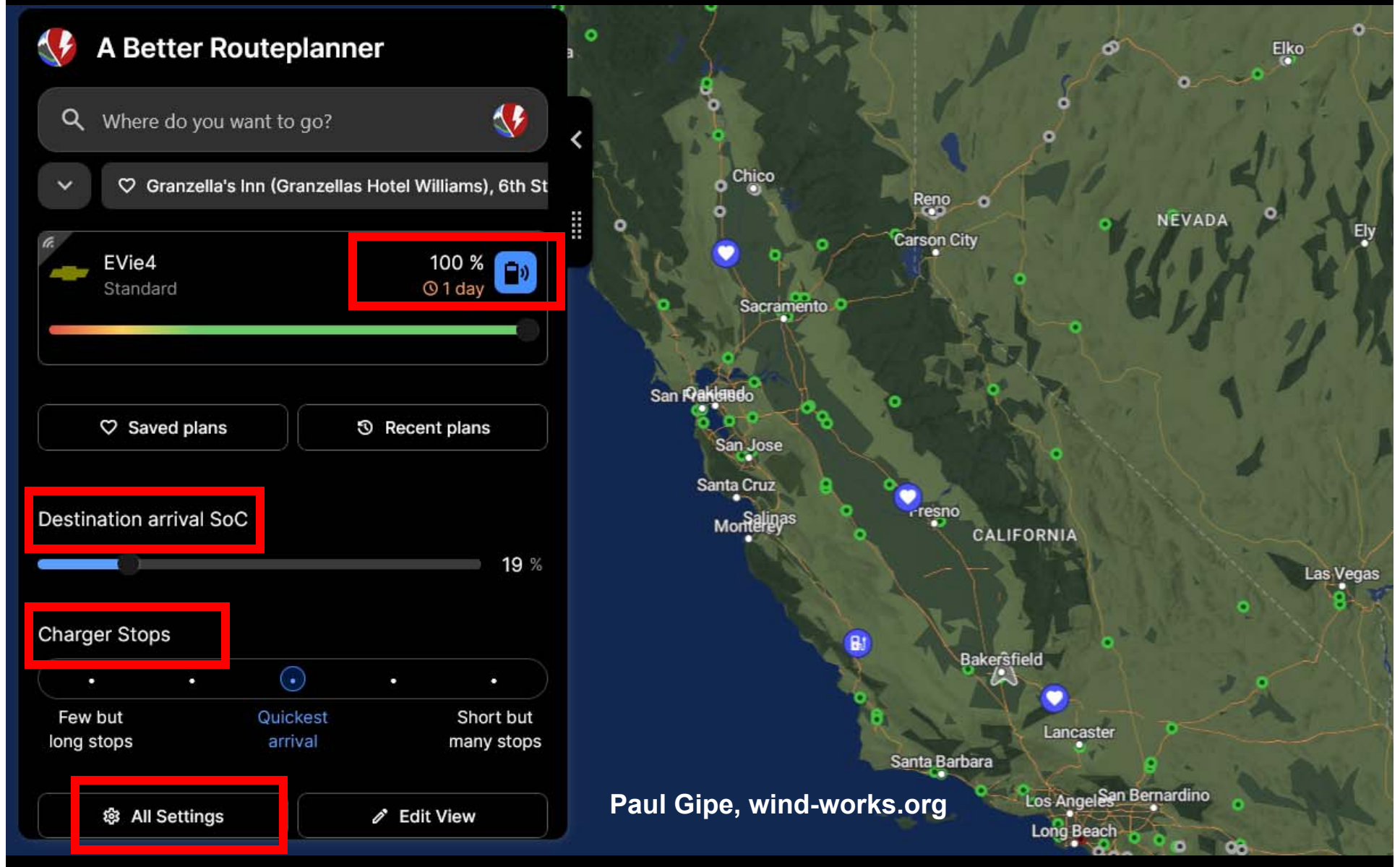
W Upjohn Ave

E Upjohn Ave

Walmart Supercenter

Ridgecrest Landfill

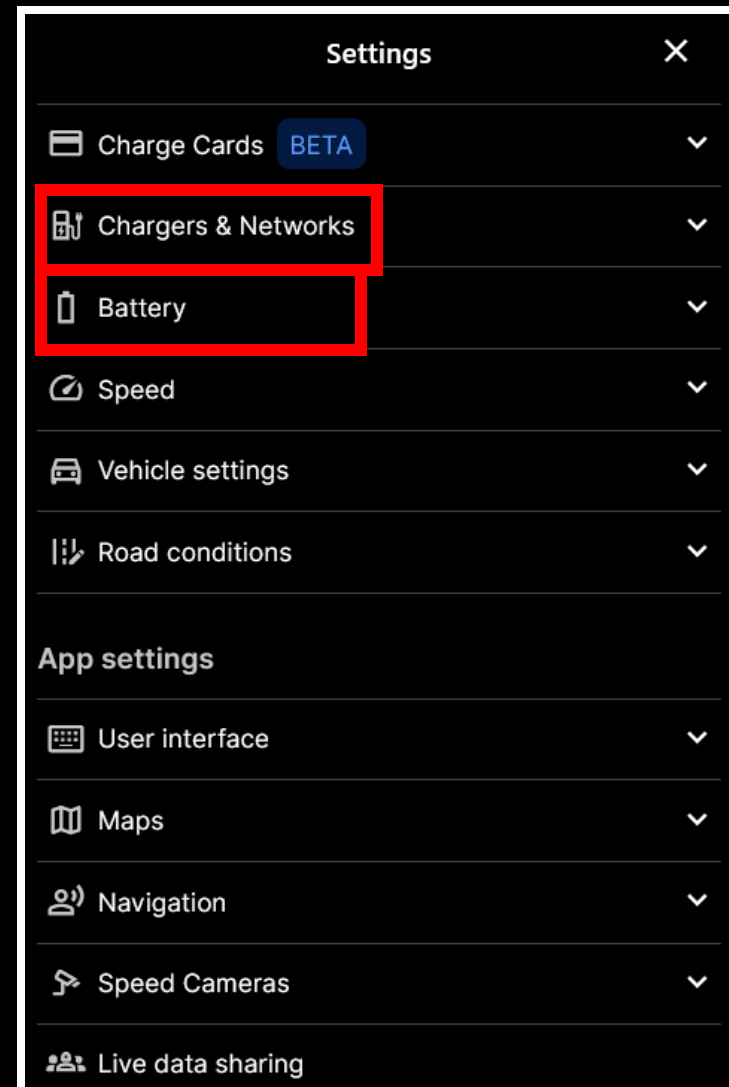
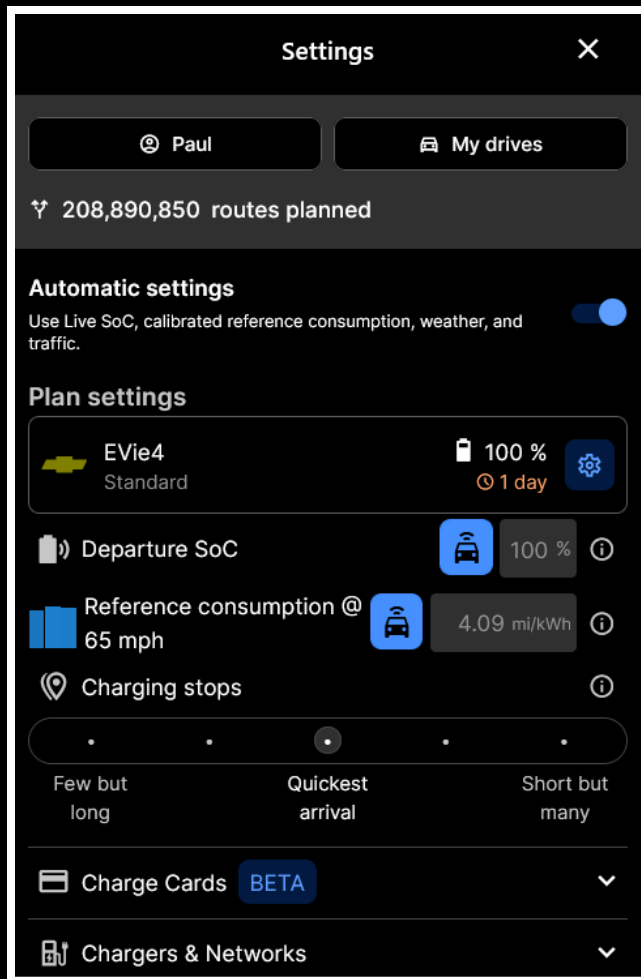
ABRP: EV Navigation App



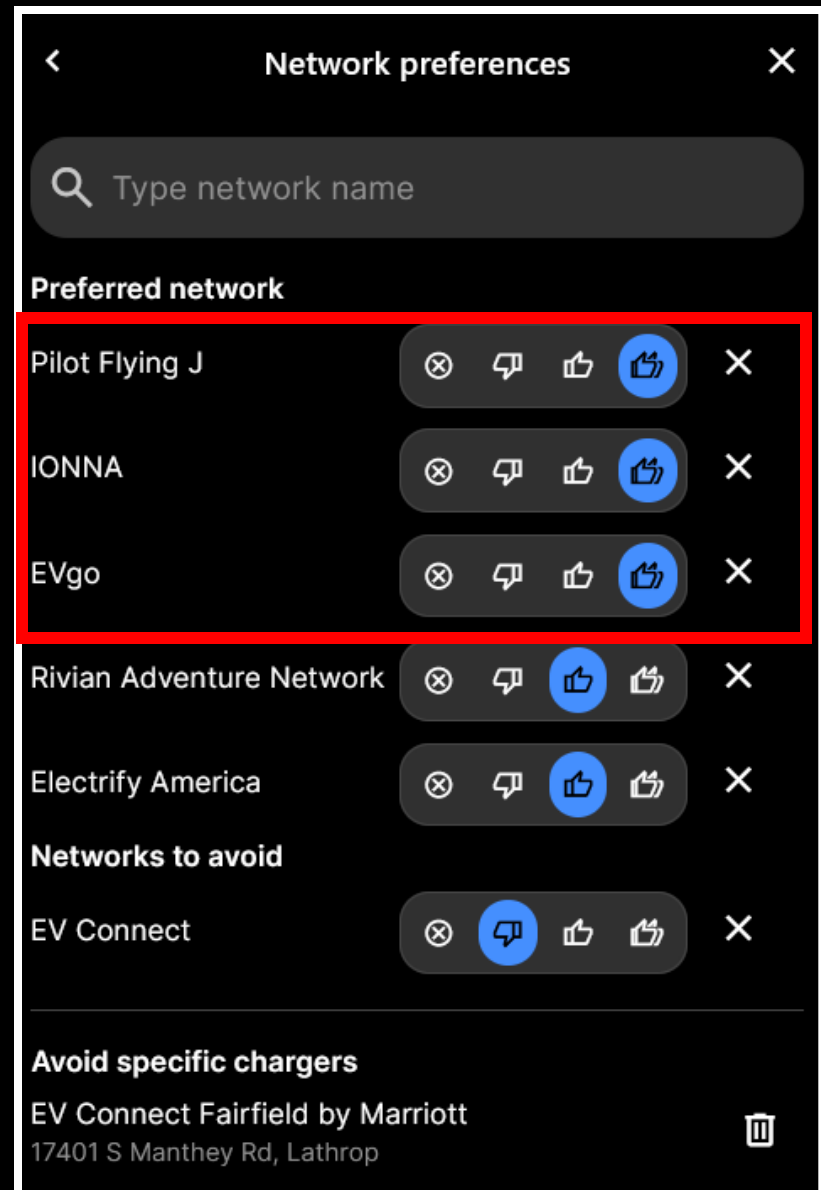
ABRP: EV Navigation App



ABRP: Settings



ABRP: Settings



ABRP: Settings

 Battery 

Destination arrival SoC19 %

Charger arrival SoC19 %

Charger max SoC80 %

Charging overhead10 min

 Speed 

 Vehicle settings 

Battery degradation10 %

Initial vehicle temperature68 °F

Extra weight250 lb

EV Road Tripping: Charging Networks

- The Big Boys: Tesla, EA, EVgo
ChargePoint
- Also Rans: Blink, EV Connect, etc
- Modern Charge Networks
Ionna, BP Pulse

Asilomar, CA

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What do EVs Cost?

- **25-35k:**
Leaf, Bolt, Kona, Niro, Slate?
- **35-45k:**
Ioniq, Equinox, ID4, M3
- **45-55k:**
MY, Blazer, Mach E
- **55-65k:**
Polestar
- **70-125k:**
Lucid, Rivian, F150, Silverado

Lucid at Tesla Destination Charger,
Visalia, CA. 2025



What EVs are Available New?

- **Compacts:**
Leaf, Bolt, Kona, Niro, EX30,
- **Sedans:**
Ioniq 6, Lucid, Polestar
- **SUVs:**
Equinox, ID4, Ioniq 5, Mach E
- **Trucks:**
Rivian, F150, Silverado,
Slate? Ford? Telo?



Mach E



Rivian



F150 Lightning

EVs Best Bang for the Buck

- Equinox
- Ionic 5
- 2027 Bolt



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EVs ~~vs~~ Gassers

- **Driving Dynamics—Better**
 - Low Center of Gravity
 - Instant Torque
 - More Reliable
- **Regenerative Braking**
- **Charge at Home**
 - No Gas Station
- **Not the Same**
 - Just Different

Peugeot Voiture Légère, 1940
© SochauxMuseum



Regenerative Breaking & One-Pedal Driving

- Puts Fuel Back in the Tank
- ~2/3 Reclaimed
- Varies Among Models
- “Aggressive” is Best
- “one-pedal” driving



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Stuck in Traffic?

- No worries
- No Idling!



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Inyokern, CA

EV Batteries

- **Today: Lithium NMC**
Nickel, Manganese, Cobalt
- **Soon: Lithium-Iron-Phosphate**
Manganese Rich
- **Cheaper—More Stable**

EV Range & Battery Capacity



EV Shopping

- Online Only
- Out-the-Door Only
- All-in
 - Taxes & Fees
- Taxes & Fees = 10%
- 30k EV
 - + 3k Taxes & Fees ~33k

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Proud New EV Owner, Maryland



Online EV Shopping

Find the Window Sticker

 CALL 619-327-9965

REQUEST A QUOTE

FREE INSTANT CREDIT CHECK

START ONLINE BUYING PROCESS

 Price Watch

 Save

 Window Sticker

Estimated Date of Arrival 09/22/2020

Online Window Sticker

Window Sticker

2020 Chevrolet Bolt EV

Hatchback



VIN	1G1FY6S05L4142580
Engine	Electric drive unit
Transmission	Automatic
Trim	LT
Color	Slate Gray Metallic

Pricing

Destination Charge	\$875.00
Installed Options	
<u>DC fast charging</u>	\$750.00
LPO, All-weather floor mats, front and rear	\$150.00
<u>Driver Confidence Package</u>	\$495.00
<u>Comfort and Convenience Package</u>	\$555.00
Total Options	\$1,950.00

MSRP*

SEE DEALER

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Monroney (Window) Sticker



2023 BOLT EUV LT

EXTERIOR: BRIGHT BLUE METALLIC
INTERIOR: JET BLACK



PULL THIS STRIP TO EXPOSE ADHESIVE

STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

OWNER BENEFITS

- 3 YEAR / 36,000 MILE* BUMPER-TO-BUMPER LIMITED WARRANTY
- 8 YEAR/100,000 MILE* ELECTRIC PROPULSION COMPONENT LIMITED WARRANTY
- *WHICHEVER COMES FIRST SEE CHEVROLET.COM OR DEALER FOR TERMS, DETAILS & LIMITS

PERFORMANCE & MECHANICAL

- DC FAST CHARGING PROVISIONS
- CHARGING MODULE, 11.5 KW
- ELECTRONIC PRECISION SHIFT WITH ONE PEDAL DRIVE MODE
- DRIVE MODE CONTROL SWITCH, NORMAL/SPORT
- DUAL LEVEL CHARGE CORD

INTERIOR

- SEAT ADJUSTERS, DRIVER AND FRONT PASSENGER 6-WAY MANUAL
- SEAT, REAR 60/40 SPLIT-FOLDING
- DRIVER INFORMATION CENTER, 8" DIAGONAL MULTI-COLOR DISPLAY

EXTERIOR

- WHEELS, 17" ALUMINUM
- HEADLAMPS, LED
- DAYTIME RUNNING LAMPS, LED
- LAMPS, STOP AND TAIL, LED
- MIRRORS, OUTSIDE HEATED, POWER ADJUSTABLE, INTEGRATED TURN SIGNAL INDICATORS, MANUAL FOLDING
- WIPERS, FRONT INTERMITTENT, VARIABLE
- WIPER, REAR INTERMITTENT WITH WASHER

SAFETY & SECURITY

- CHEVY SAFETY ASSIST:

- *AUTOMATIC EMERGENCY BRAKING
- *FRONT PEDESTRIAN BRAKING
- *LANE KEEP ASSIST W/ LANE DEPARTURE WARNING
- *FOLLOWING DISTANCE INDICATOR
- *FORWARD COLLISION ALERT
- *INTELLIBEAM-AUTO HIGH BEAM
- *PEDESTRIAN FRIENDLY ALERT
- *HEADLAMP CONTROL AUTOMATIC ON & OFF
- *TIRE PRESSURE MONITOR SYSTEM
- *HD REAR VISION CAMERA
- *TIRE FILL ALERT

CONNECTIVITY FEATURES

- REMOTE VEHICLE START
- CHEVROLET INFOTAINMENT 3 PLUS 10.2" DIAG HD COLOR TOUCHSCREEN VOICE RECOGNITION BLUETOOTH AUDIO STREAMING WIRELESS APPLE CARPLAY & WIRELESS ANDROID AUTO CAPABLE, IN-VEHICLE APPS AND

- PERSONALIZATION CAPABLE
- SIRIUSXM AUDIO WITH SXM TRIAL SUBSCRIPTION
- 3 YEARS REMOTE ACCESS PLAN: ONSTAR & WI-FI DATA CAPABLE SEE ONSTAR.COM FOR TERMS
- WIRELESS DEVICE CHARGING
- EFFICIENCY DISPLAY SCREENS W/ PROGRAMMABLE CHARGE TIMES
- KEYLESS OPEN/START

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$27,800.00

OPTIONS & PRICING

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

COMFORT PACKAGE: 895.00

- STEERING WHEEL, HEATED, AUTOMATIC
- SEAT ADJUSTER, DRIVER 8-WAY PLUS 2-WAY POWER LUMBAR

Visit us at www.chevy.com

- DRIVER & FRONT PASSENGER HEATED SEATS
- LEATHER WRAP STEERING WHEEL
- DRIVER CONFIDENCE PACKAGE: 495.00
- REAR CROSS TRAFFIC ALERT
- LANE CHANGE ALERT WITH SIDE BLIND ZONE ALERT
- BRIGHT BLUE METALLIC 395.00
- PROPULSION BATTERY, US CELLS INC.
- REAR PARK ASSIST INC.

TOTAL OPTIONS \$1,785.00

TOTAL VEHICLE & OPTIONS \$29,585.00

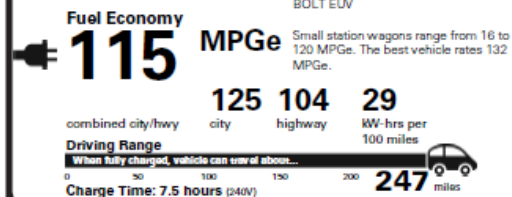
DESTINATION CHARGE 995.00

TOTAL VEHICLE PRICE* \$30,580.00

EPA DOT Fuel Economy and Environment



Electric Vehicle



You save \$5,000

in fuel costs over 5 years

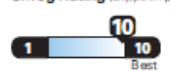
compared to the average new vehicle.

Annual fuel cost \$600

Fuel Economy & Greenhouse Gas Rating (tailpipe only)



Smog Rating (tailpipe only)



This vehicle emits 0 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Does not include emissions from generating electricity; learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$0.14 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles



GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger ★★★★★

Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Rear seat ★★★★★

Based on the risk of injury in a side impact.

Rollover ★★★★★

Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA)

www.safercar.gov or 1-888-327-4236



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onstar.com/privacy

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 58%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA 13%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
LAKE ORION, MI U.S.A.
COUNTRY OF ORIGIN:
ENGINE (MOTOR): KOREA
TRANSMISSION (ELECTRIC DRIVE UNIT): KOREA

This label has been applied pursuant to Federal law - Do not remove prior to delivery to the ultimate purchaser. *Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

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ORDER NO 0045VSG SALES CODE E

SALES MODEL CODE 1FF48

DEALER NO 14812

FINAL ASSEMBLY:

LAKE ORION, MI U.S.A.

VIN 1G1FY6S09P4186488

REISSUE

DEALER TO WHOM DELIVERED

BOB BELL CHEVROLET OF BEL AIR, INC.
1230 BEL AIR RD
BEL AIR, MD 21014-5107



Checking Dealer Inventory

- All GM Web Sites the Same
- Set Search Filter for Your Options
- Or Ask “Internet Sales” to do This
- Confirm “Window Sticker”

Filtered Search

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[HOME](#) [NEW INVENTORY ▾](#) [USED ▾](#) [SPECIALS ▾](#)

1 VEHICLE FOUND

NEW 2020 CHEVROLET BOLT EV

5dr Wgn LT

MSRP **\$40,230**

BOB STALL SAVINGS \$15,000

BOB STALL PRICE \$25,230

[See Important Disclosures Here](#)

SPECIAL



Bob Stall Chevrolet **(800) 695-1311**

*\$0 Down Delivers on Approved Credit. Not All Customers Will Qualify.

 [Quick View](#) [43 photos](#)

Buying or Leasing Tips

- **Buy/Lease Near Year End (Now)**
- **Deal Only with Internet Sales**
- **Do Not Call Dealer**
- **Know What You Want**
- **Know What You Expect to Pay**
- **Be Flexible on Color**
- **Deal Only with “All in” or Out-the-Door Price**
- **Confirm Choice with VIN or Stock No.**

Once You Have an EV

- **Register**
 - for Charge Networks
 - for Company
 - with ABRP
 - with Recurrent
- **RTFM (Read the Manual)**
- **Know How to Use it**
 - The Manual
 - PDF Can be Searched
 - The Car

Recurrent: EV Tool

Estimated Range

Battery

Range

Savings & Warranty



My Expected Range

256 – 271 mi

The distance this car can drive in typical conditions based on the vehicle's range estimate.



Original EPA Range

259 mi

The advertised range when new based on a specific set of tests developed by the EPA.



Est. Range in 3 Years

243 – 257 mi

The expected range for this vehicle in 3 years based on typical use and aging.

Recurrent: EV Tool

Estimated Range

- One Way
- Round Trip

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Travel Range

This is the likely range for this vehicle for round trip and one-way travel from 93305. [Learn more](#)



■ One Way ■ Round Trip

Recurrent: EV Tool

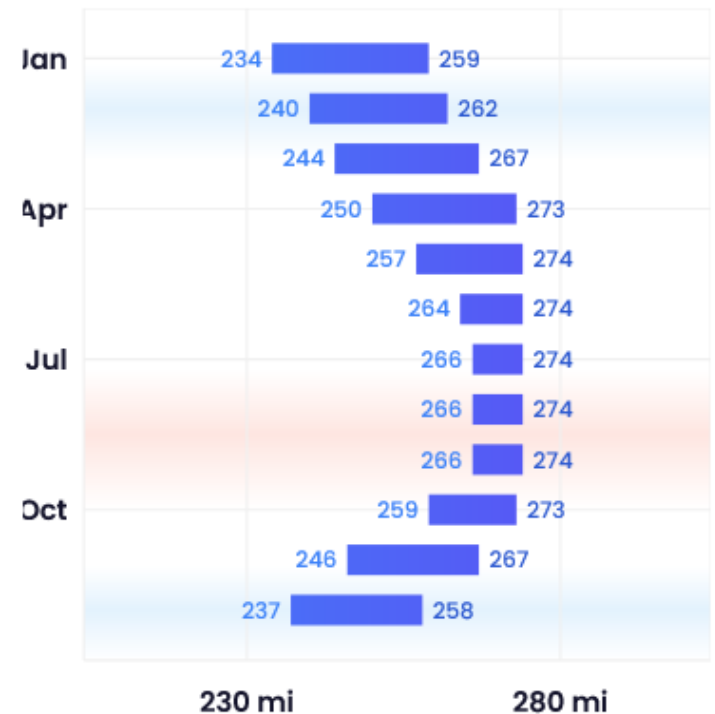
Seasonal Range

- Farther in Summer
- Less in Winter

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Seasonal Range

Your likely range in the typical weather for Bakersfield (93305) is 256 – 271 miles.

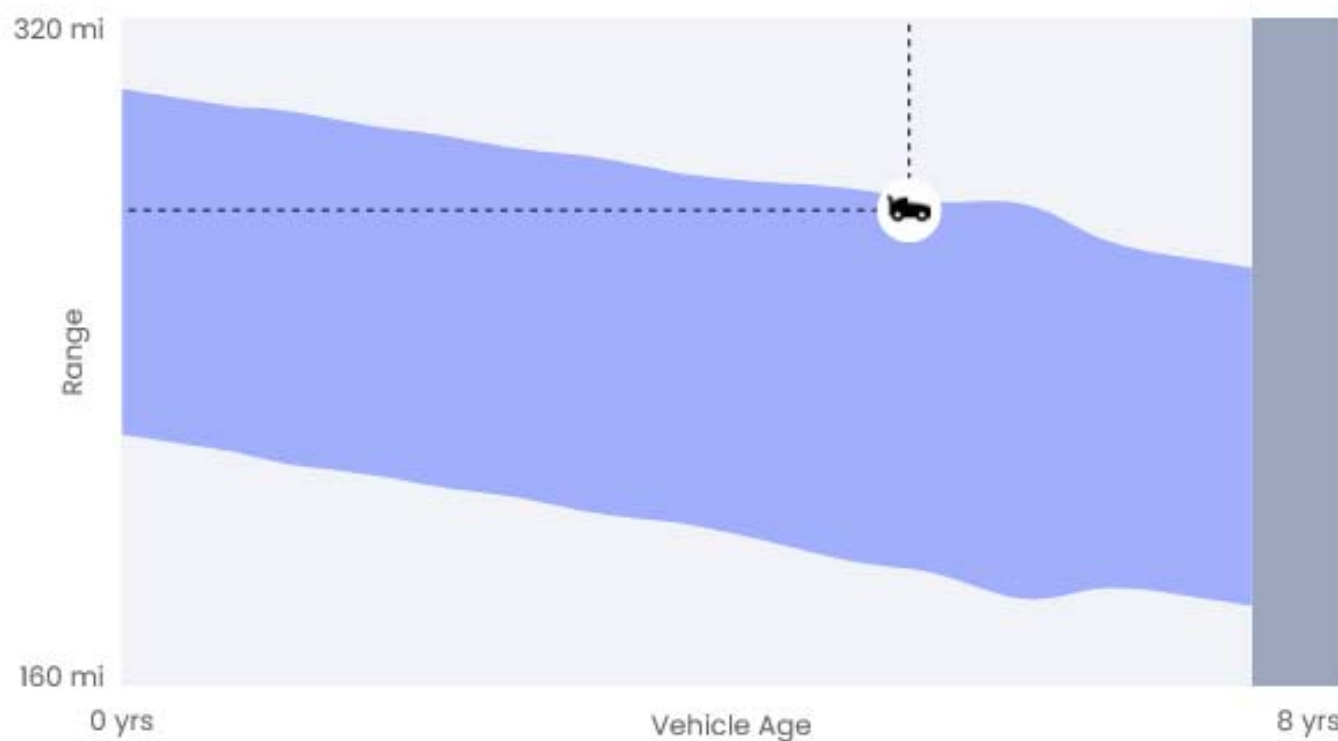


Local expected range (miles)

Recurrent: EV Tool

Range Status

How's my range compared to others?



Your range is:
Comparable

The band represents
all vehicles that are
similar to yours.

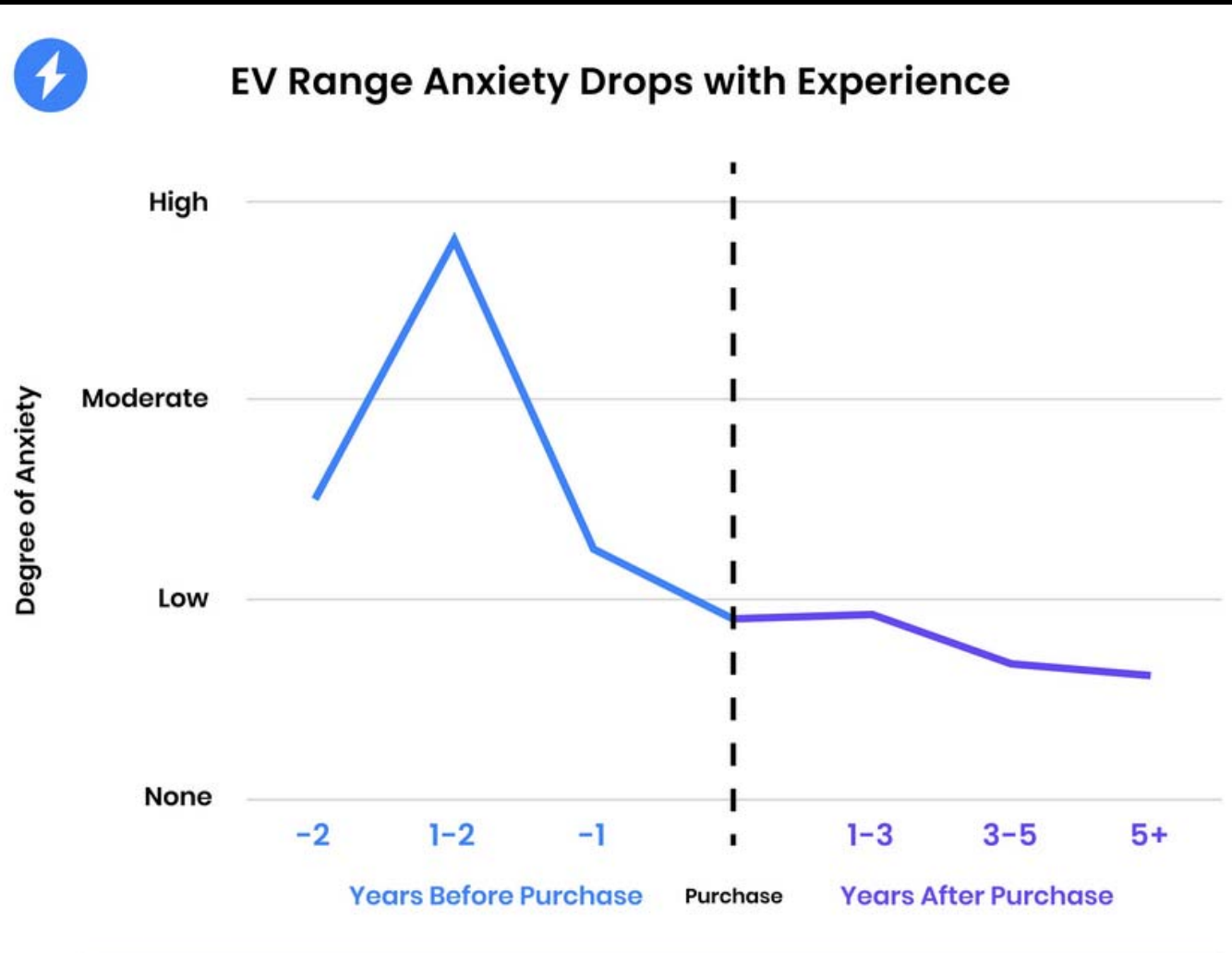
[Learn more](#)

 This vehicle  Similar cars  Not enough data

Paul Gipe, wind-works.org

Recurrent: Range Anxiety

<https://www.recurrentauto.com>



Recurrent (www.recurrentauto.com) provides electric vehicle battery health reports for EV owners, shoppers and dealers. This infographic is ©2023 Recurrent and may only be reproduced with permission and attribution.

contact@recurrentauto.com

Recurrent: EV Tool

Current Value of Your Car

Estimated Market Value

Market value is an estimate based on aggregate national retail listings.



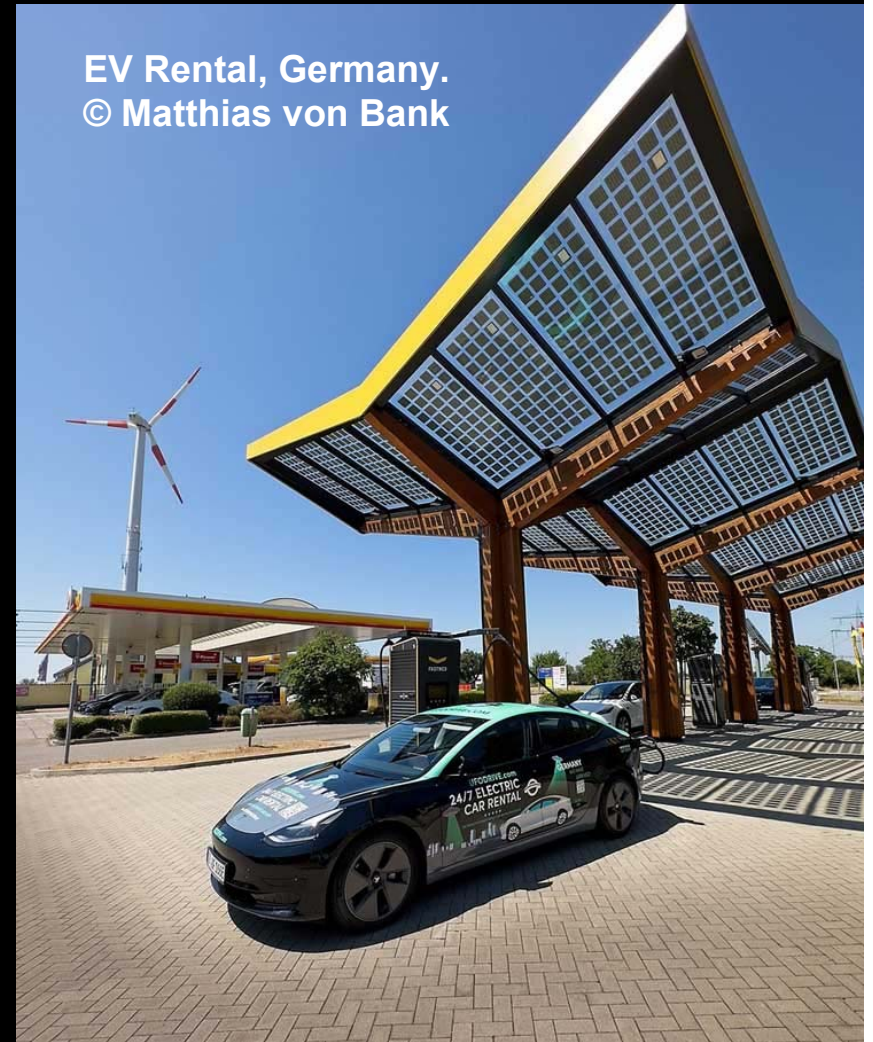
Monthly Price Trend: 1.01%

EV Running Costs*

- Wipers
- Tires
- 12 V Battery
- Little Maintenance
- Little Brake Wear

*Based on 50,000+ miles, 4 years

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EV Rental, Germany.
© Matthias von Bank

FastNed DCFC.

EV Running Costs Batteries

- Last Longer than Car
- Calif. Warranty

8 years or 100,000 miles

Santa Cruz, CA



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Recurrent: Fuel Savings 2020 Bolt

- ~\$900/yr
- Level 2
At Home

MONTHLY YEARLY

\$1,703 ⚡ Electric Cost	\$2,588 ⛽ Fuel Cost
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Gas savings of \$885

Daily miles driven
37
National average is 37 miles

Daily electric rate (per kWh)
\$ 0.44
National average is \$0.17 per kWh

Gas price per gallon
\$ 4.60
National average is \$3.48 per gallon

Fuel efficiency (MPG)
24
National average is 24 mpg

EV Fuel Cost DCFC

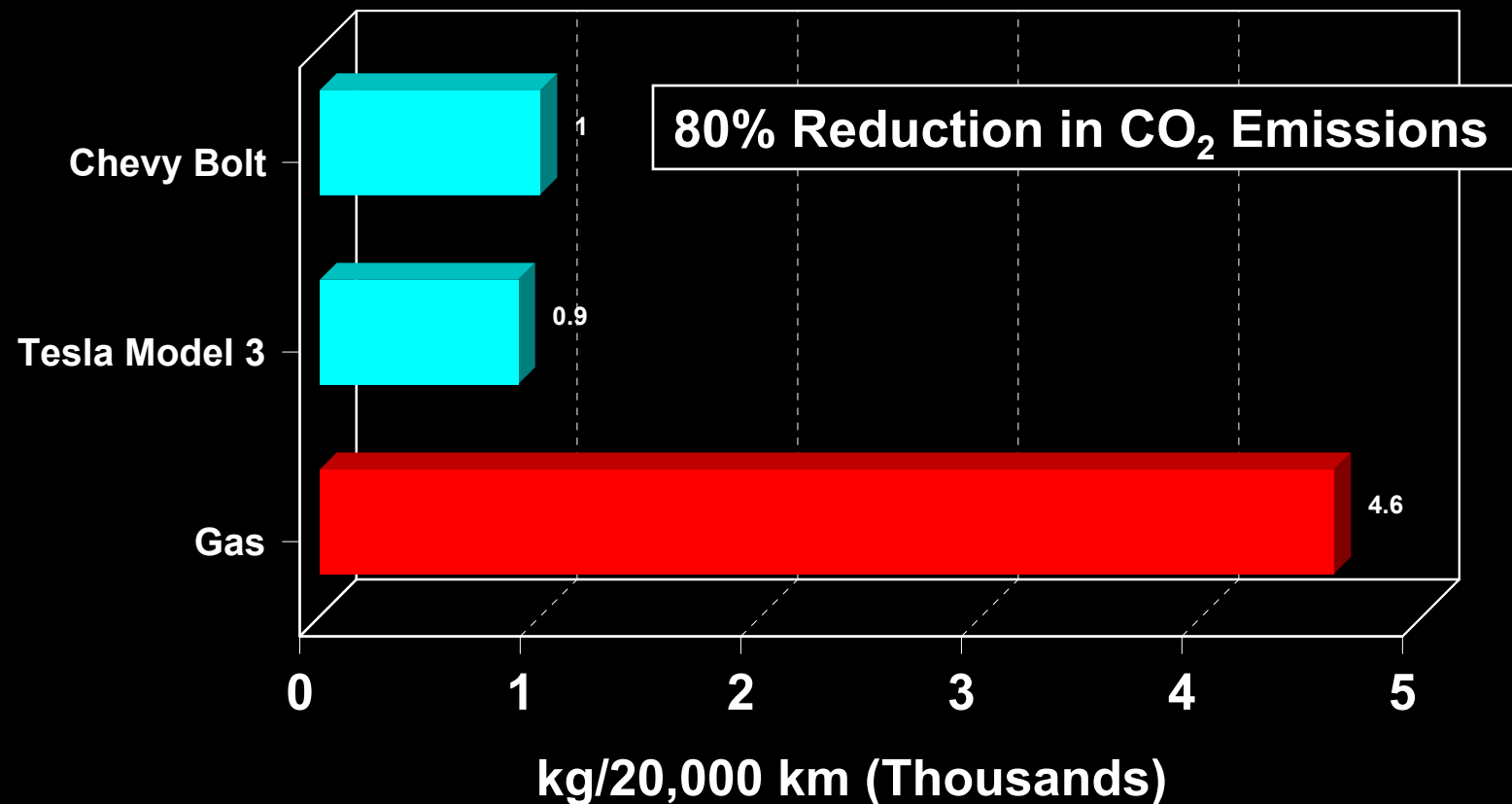
- Roadtripping: Same as Gas

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Hwy 166, West of Cuyama

EV Emissions: Lowest Total CO_{2e} Emissions

with California Generating Mix



Enjoy Your Drive



Bolt EUV 2025, Ohio

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EVs—Simply Better Cars Scrap the Gasser



Bodie, California



EV
CHARGING
ONLY

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