SUSTAINABLE HUDSON VALLEY

CLIMATE SOLUTIONS WEEK

EV Intro 2022

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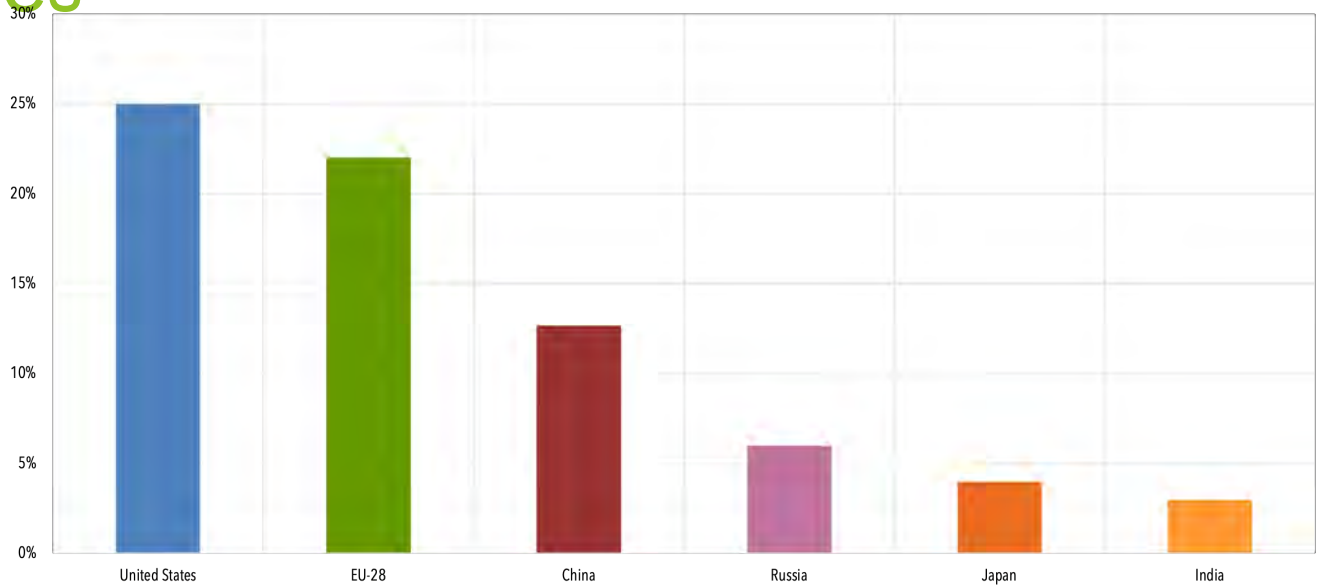
What concerns you about buying an Electric Vehicle?

- Cost
- How to Charge
- Not enough range
- Battery will wear out
- Safety
- Towing
- Too new technology
- Not really “clean”

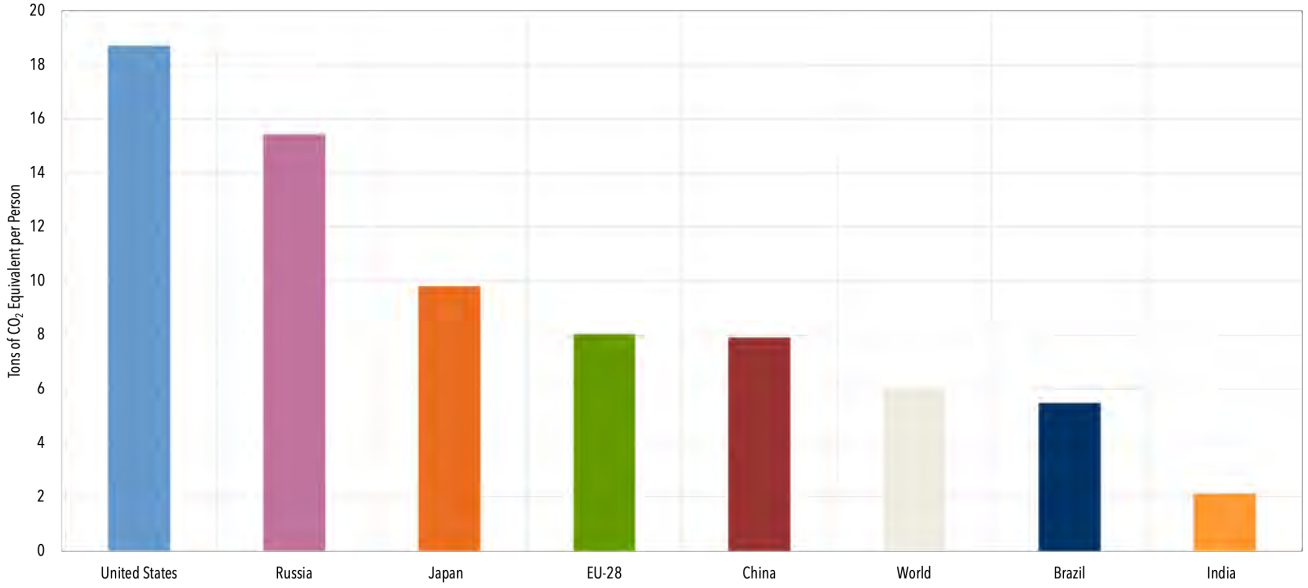
2022 Hyundai Kona EV
Starting at $34,000

America Should play a Leading Role in Reducing Greenhouse Gases

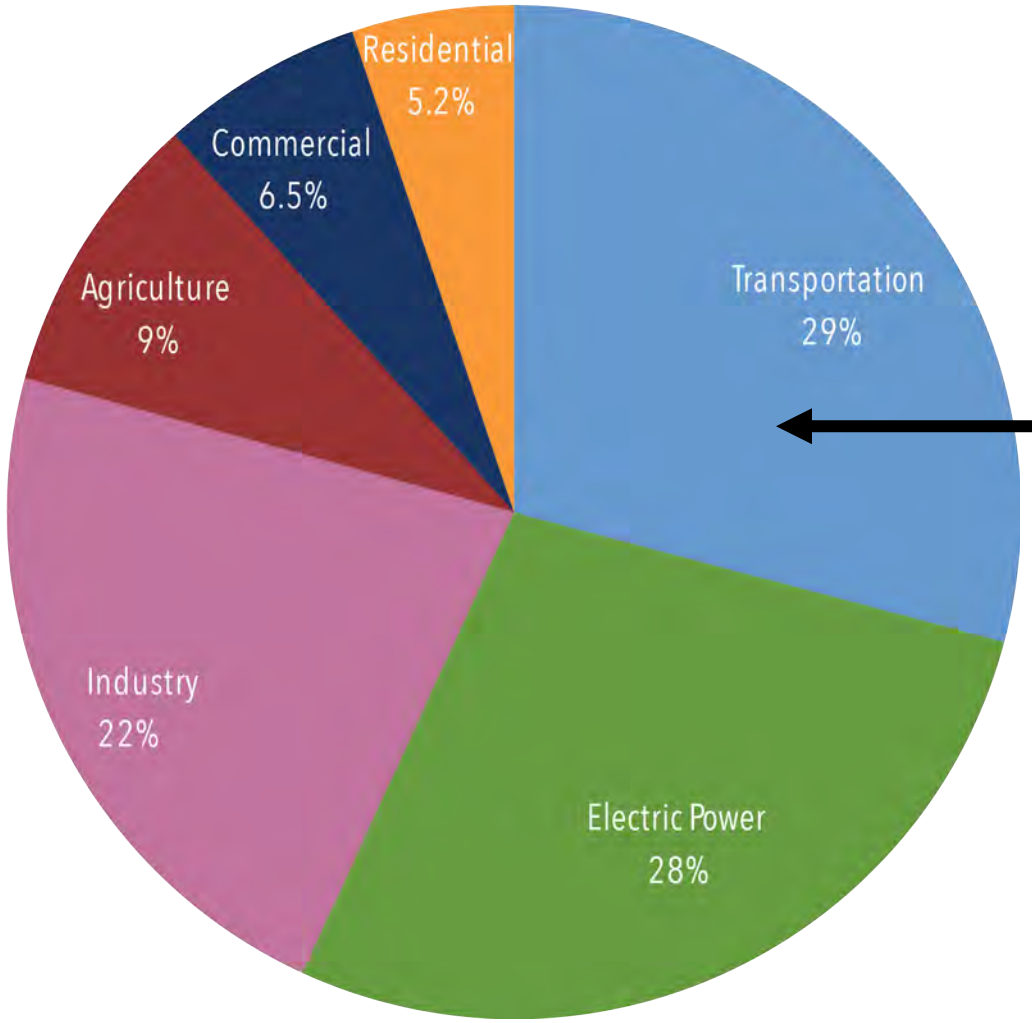
Cumulative Emissions, 1751-2017



Per Person Emissions 2017



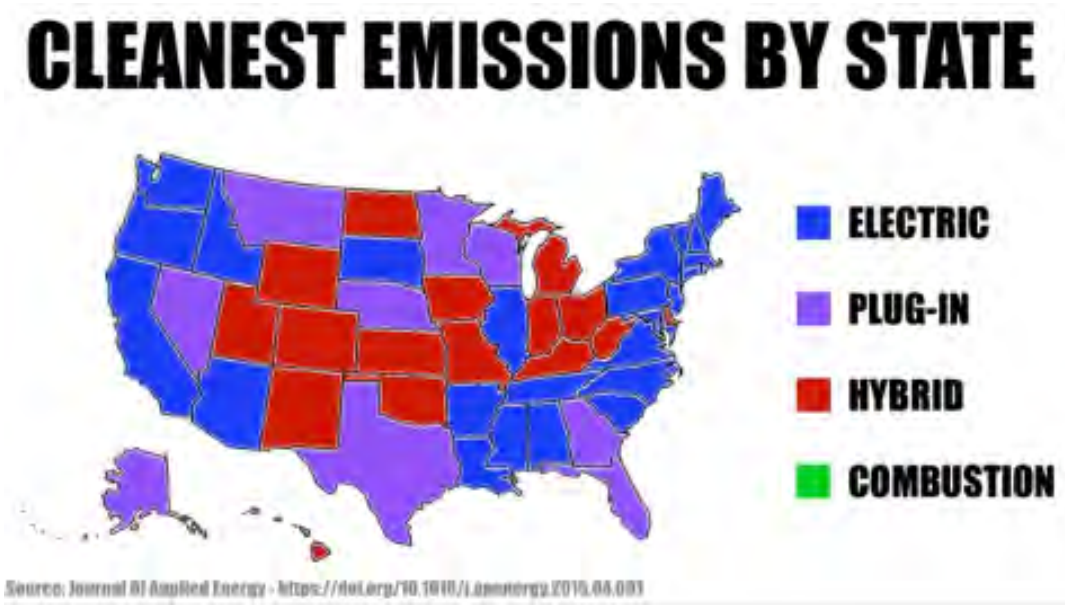
Electric Vehicles can help us reduce greenhouse gases



Cars and Trucks emit more greenhouse gasses than any other sector of our economy.

But do EVs really produce less Greenhouse Gas than a Gas Car?

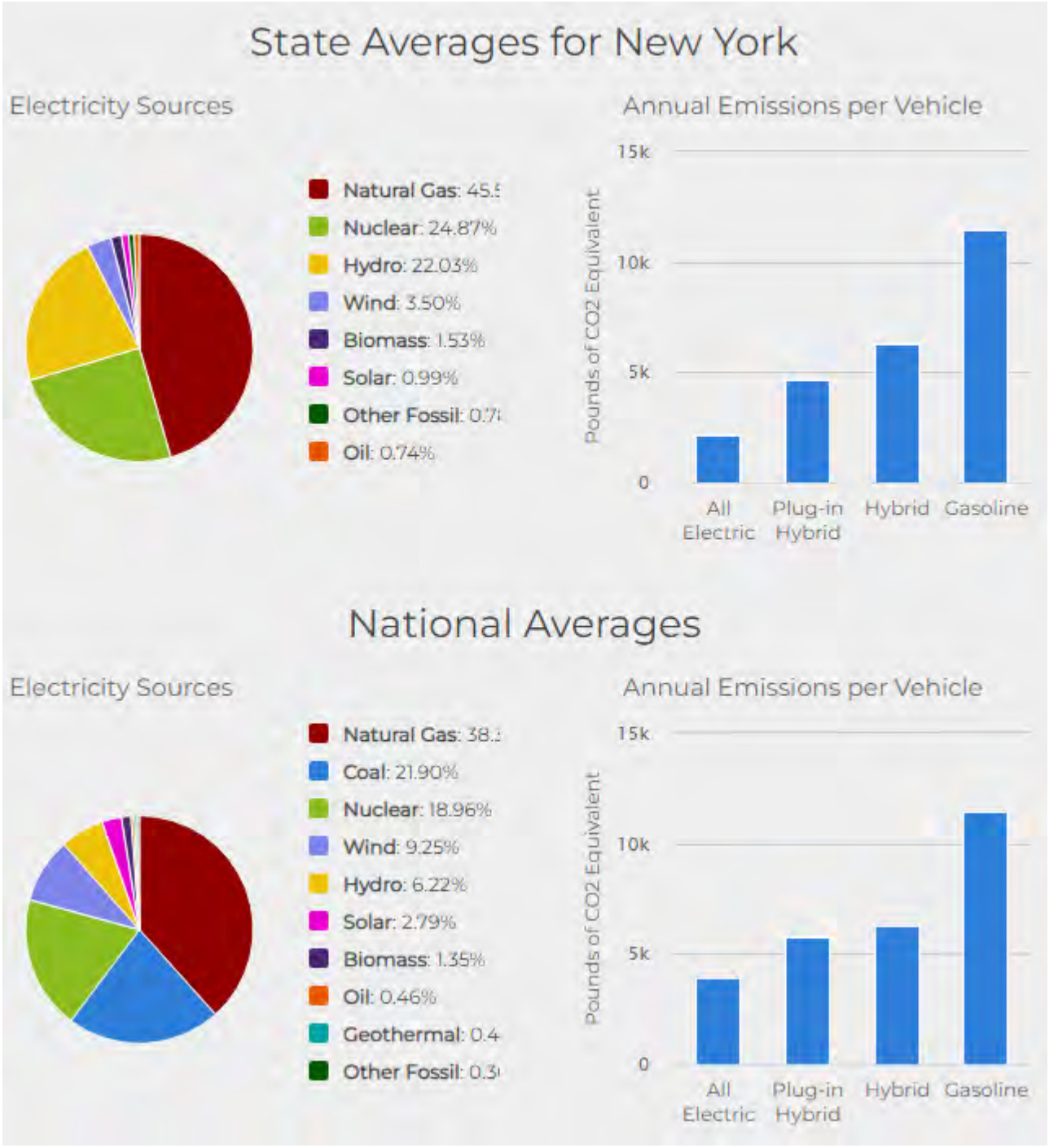
- Yes. Over their lifetime.
- Every study concludes **EVs produce more GHGs to build**, due to the battery.
- But **that difference is offset within a few years of driving** by much lower tailpipe emissions.
  - **About 2.5 years** on average.
  - Depending on your state's energy mix and the car's battery size.
- See video below for detailed explanation.
- And none of the above studies include the GHG emissions of Oil extraction and transportation.
- In NY my Tesla reaches parity with a gas car after 1.5 years.



In states with a dirtier energy mix, it may be better to drive a vehicle with a smaller battery, like a hybrid.

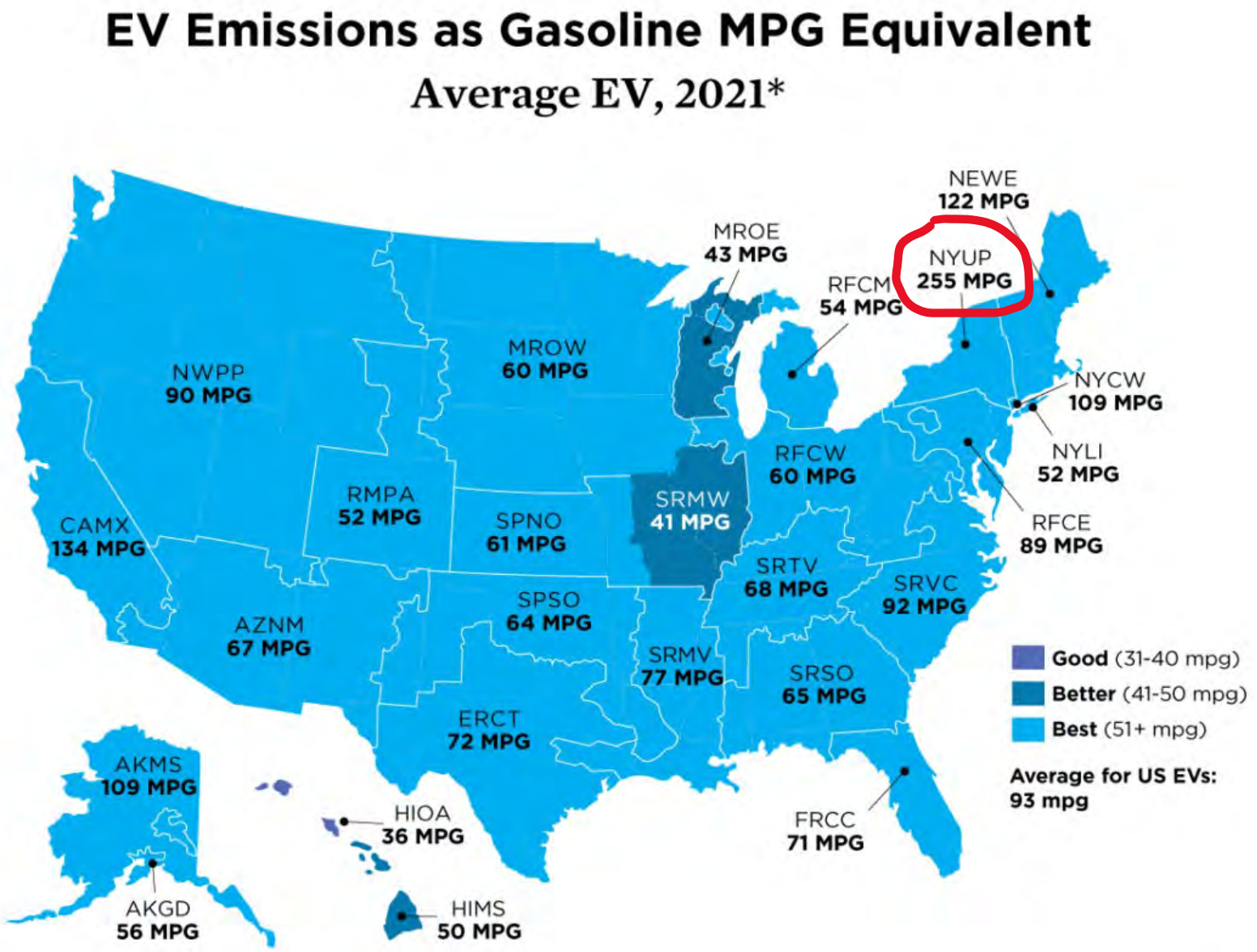
Source: https://www.youtube.com/watch?v=6RhtiPefVzM

Saving Greenhouse Gas Emissions



Source:
afdc.energy.gov/vehicles/electric_emissions.html

Saving Greenhouse Gas Emissions



EVs are Much Cleaner than Gasoline Cars, Especially in NYS

In NYS, EVs have an average efficiency between **52mpg** in Long Island – and **255mpg** upstate (highest in the nation). Traditional cars have stagnated at **~25mpg**. EVs nationwide average **93mpg**.

EVs are the only vehicles that get cleaner as you drive them. As the grid gets cleaner, your EV gets cleaner.

Types of “Electrified” Vehicles

Mild Hybrid

- Very small battery (2-4 kWh)
- Primarily Gas. No plug.
- Electric range measured in yards.

Plug-in Hybrid (PHEV)

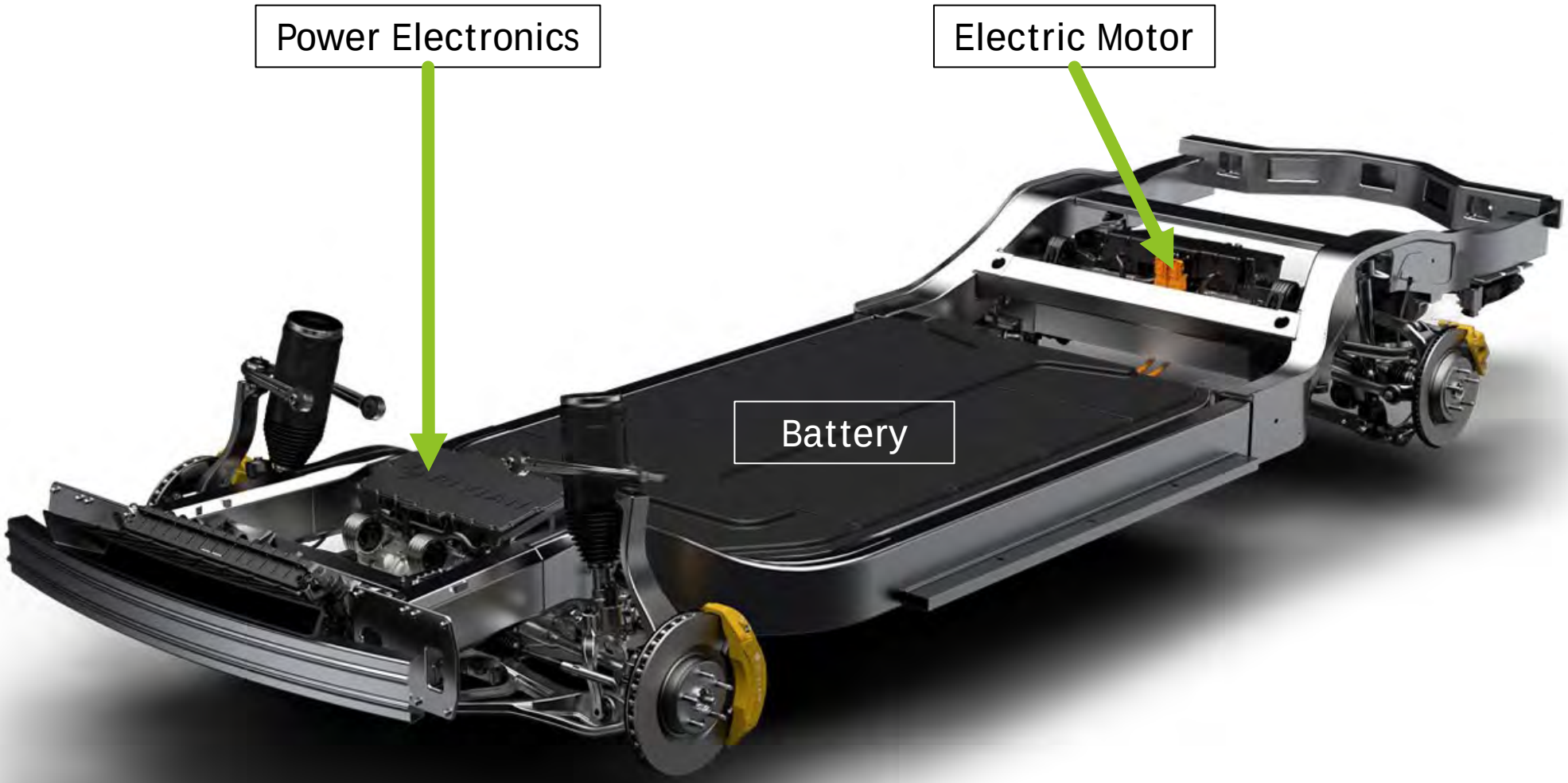
- Small battery (10-15 kWh). May charge.
- 20-40 mile electric range. After that uses gas.

2022 Tesla Model Y
Starting at $66,000

Battery Electric Vehicle (Full Electric)

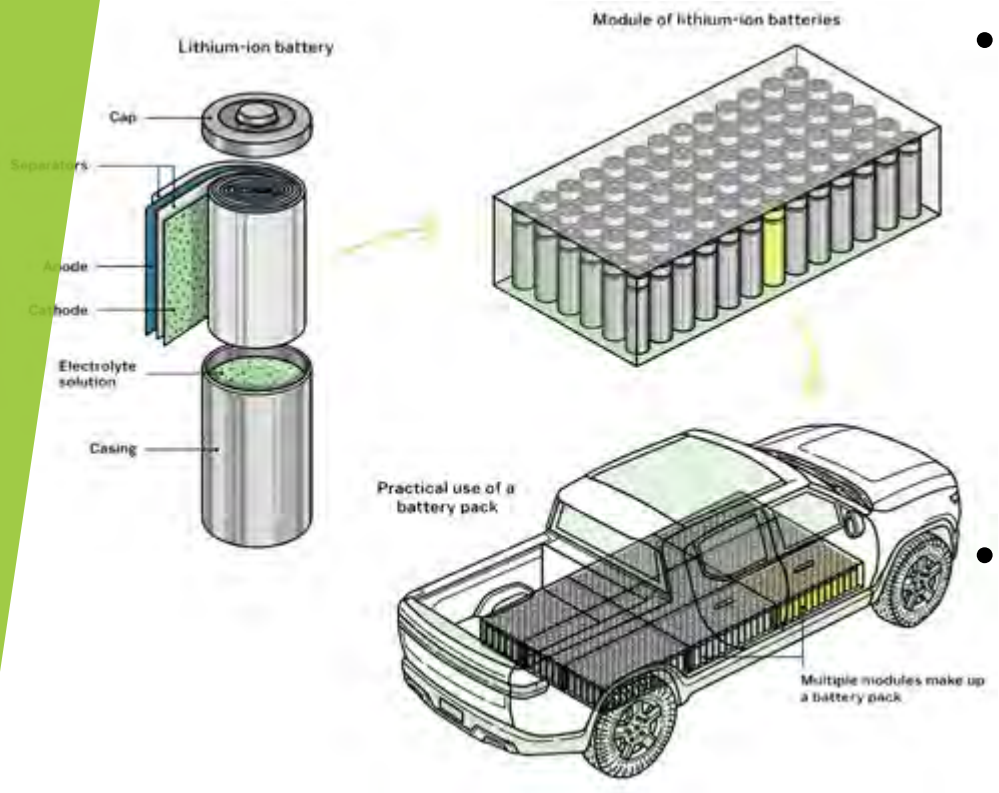
- Large battery (50-100 kWh)
- No gas. Must charge.

Basic Components of a Fully Electric Vehicle



The EV “Skateboard”

Let's Bust Some EV Battery Myths



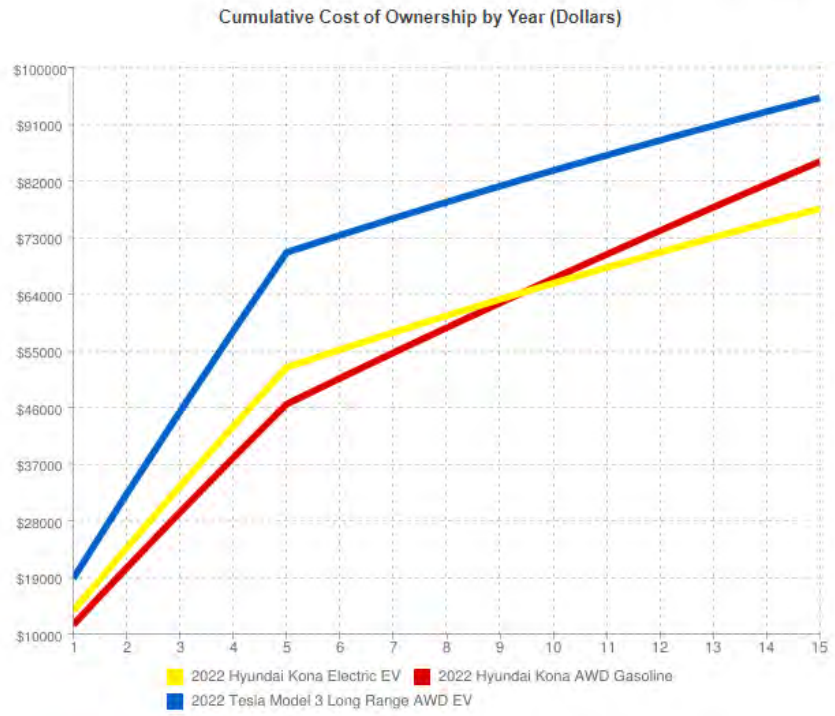
- **EVs don't work in winter.**
  - FALSE. But expect to loose 20% of your range if you park outside in winter.
- **EVs don't have enough range.**
  - FALSE. Most EVs get over 250 miles on a charge, and some get 300 or 400.
- **The battery will wear out in a few years, and need a costly replacement.**
  - FALSE. EV Batteries should last decades.
  - My Tesla battery is warranted for 8 years or 120,000 miles to still hold 70% of it's original charge.
  - Such warranties are typical of most EVs.
  - After their useful life in cars is over, the battery can be used for grid storage for another decade, then recycled.
- **EV batteries catch fire often.**
  - FALSE. EVs actually have **less fire risk** than ICE cars.
  - There are (on average) 500 ICE car fires per day in the US.
- **Charging your EV will overload the grid.**
  - FALSE. EVs can be set to charge at any time of day.
  - Most owners charge overnight, when the grid has extra power and rates are low.

Internal Combustion Engines vs Electric Motors

ICE	Electic motor	
1,6 kW/kg	4,3 kW/kg	3x power
0,4kW/lr	13,6 kW/lr	40x smaller
20-25% efficient	90-98% efficient	3-4x efficiency
Many parts	1 moving part	Maintenance free

How much will you save with an EV?

Vehicle	Annual Fuel Use	Annual Electricity Use	Annual Fuel/Elec Cost	Annual Operating Cost	Cost Per Mile	Annual Emissions (lbs CO2)
2022 Tesla Model 3 Long Range AWD EV	0 gal	4,112 kWh	$799	$3,065	$0.19	2,315
2022 Hyundai Kona AWD Gasoline	521 gal	0 kWh	$1,952	$4,421	$0.28	12,493
2022 Hyundai Kona Electric EV	0 gal	4,536 kWh	$882	$3,148	$0.20	2,554
	Graph	Graph	Graph	Graph	Graph	Graph



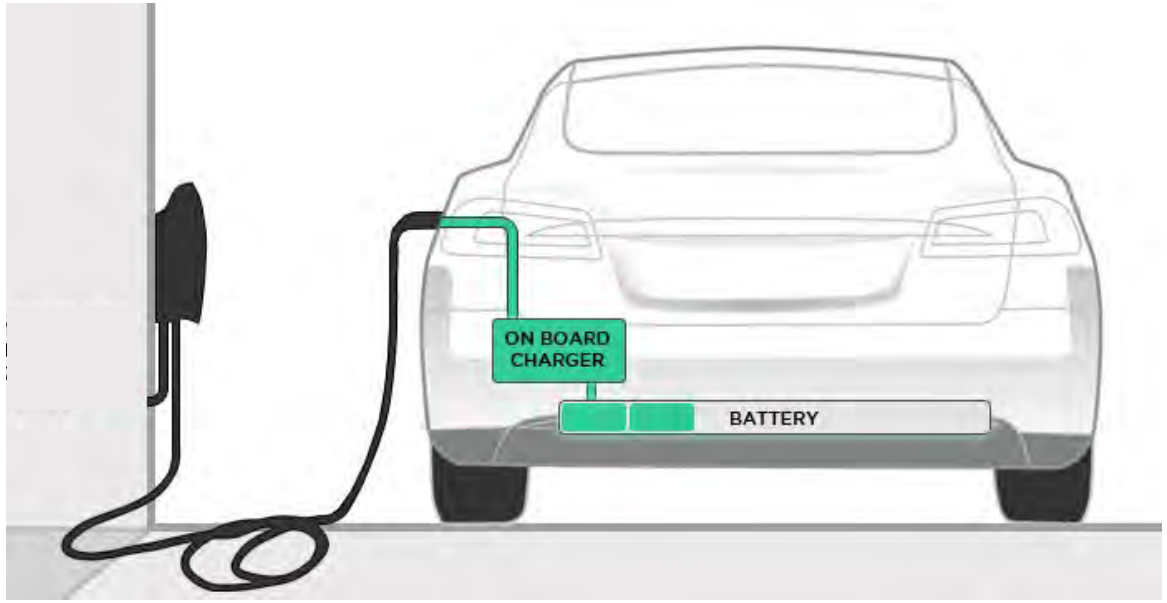
Screen output from https://afdc.energy.gov/calc/

- Calculate the cost difference between multiple cars (EV and gas) at https://afdc.energy.gov/calc/
- Includes purchase loans, maintenance, fuel, registration insurance.
  (Although I think they are adding in way too much for EV maintenance.)
- My study for the Saugerties Police Dept showed they would save over $4,000 per year in maintenance and fuel for each EV police cruiser.

How Charging Works

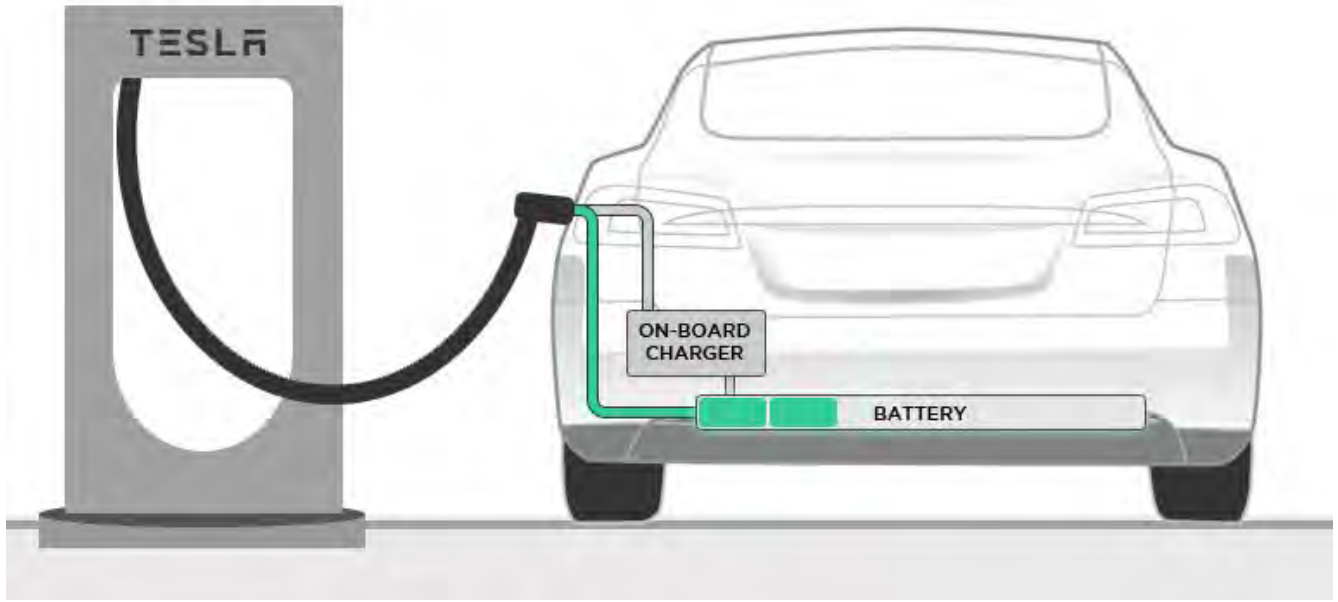
Home Charging

- 110V socket: Full charge from empty in 20-40 hours*
- Home Charger (240V): Full charge from empty in 5-7 hours*
- Car determines rate of charge.



Travel Charging

- DCFC. 80% charge from empty in 20-55 minutes*.
- Car determines rate of charge.



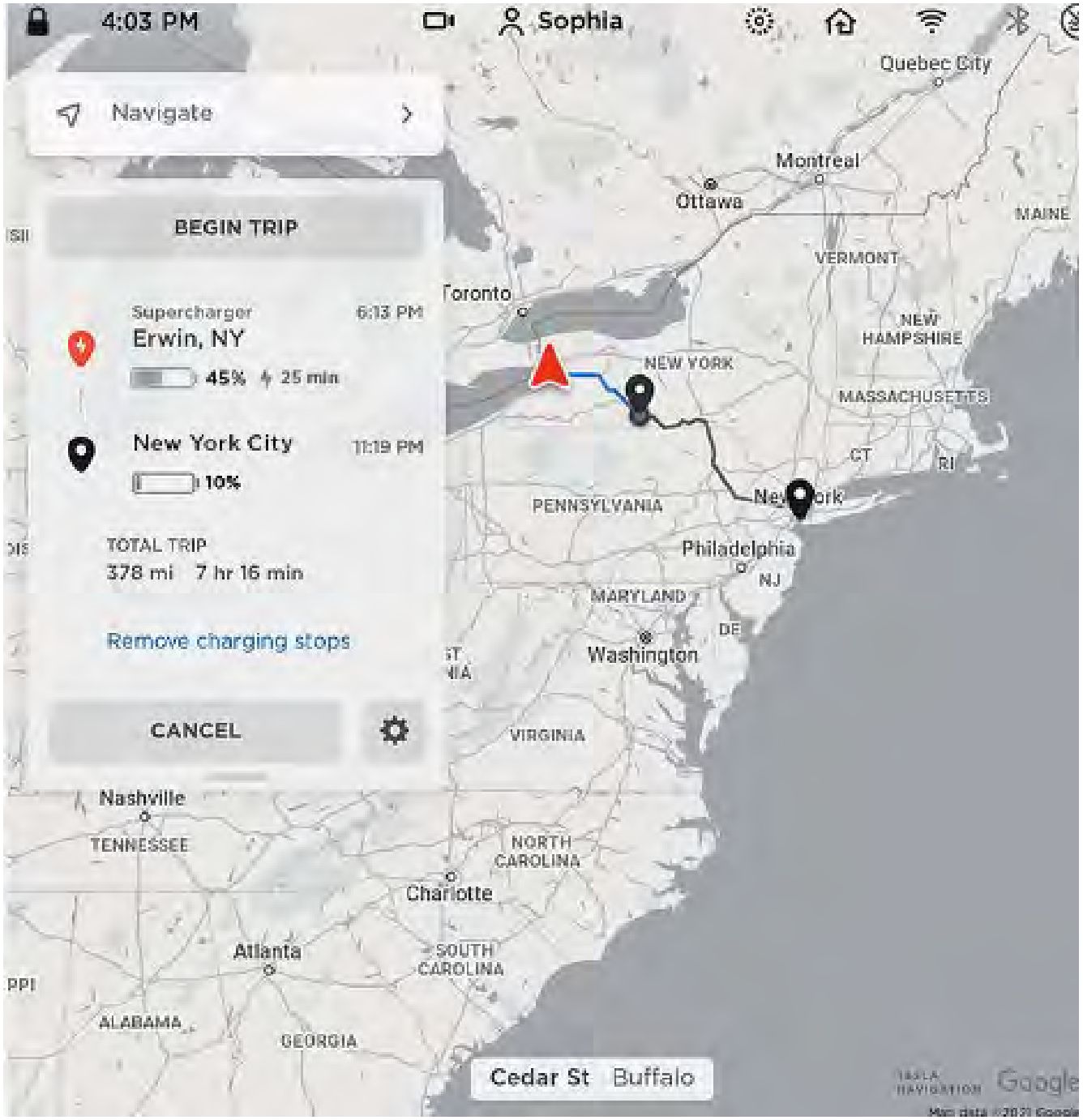
* Charging time depends on car battery size, car charge rate, charger power output.

Home Charging

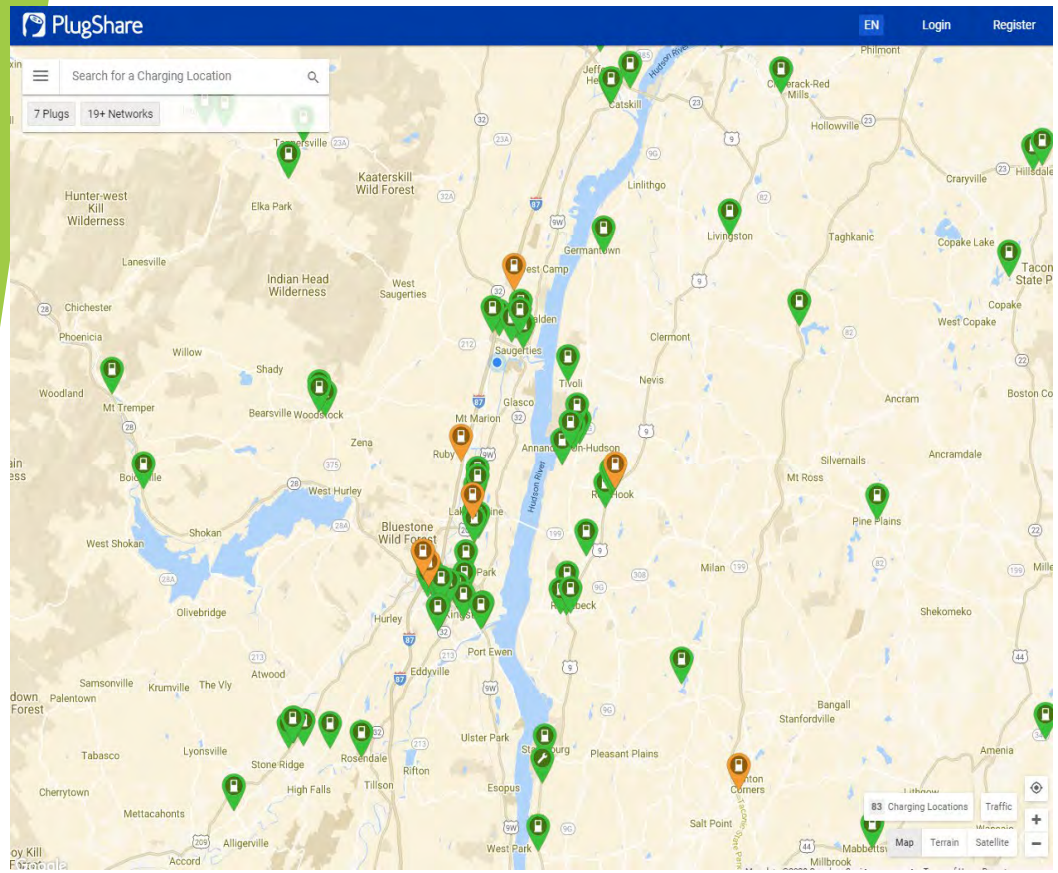
- Most people will charge at home, using the included charge cable and plug that comes with your car.
- **110v outlet** – Charge rate of approximately 4 miles/hr.
- **240v (dryer) outlet** – Charge rate of approximately 15-30 miles/hr.
  Cost about $300 for outlet installation by electrician.
- **Level 2 Home Charger** – Charge rate of approximately 25-45 miles/hr. Cost about $500 for charger, and $500 for installation by an electrician. Federal and State tax credits can pay 100%.
- No more gas station visits!

Finding Chargers

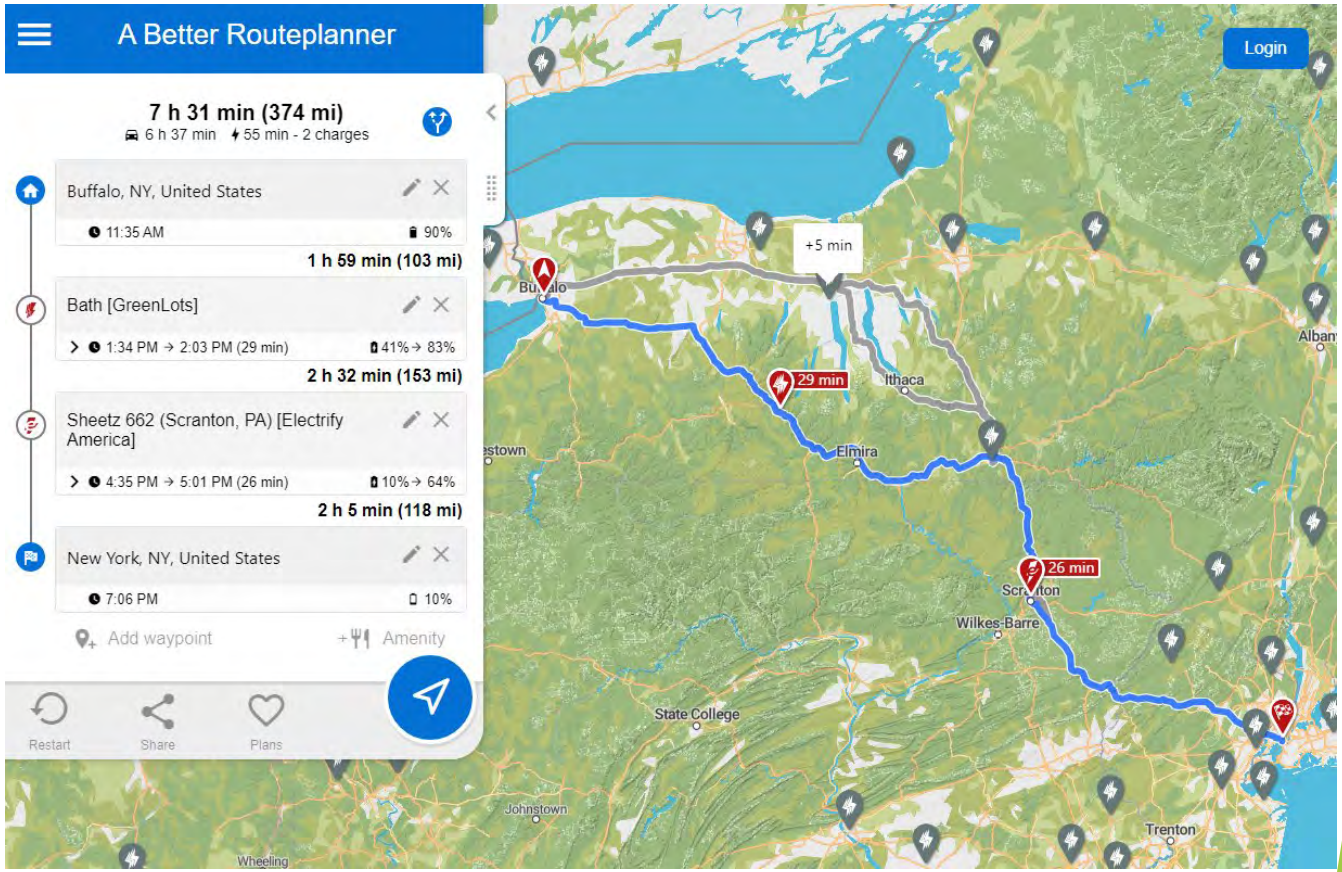
Every EV includes trip planning software in their navigation. This will direct you to needed chargers along your trip.



Finding Chargers



Use the **PlugShare** website or smartphone app to find charger locations near you.



Use "**A Better Route Planner**" website or smartphone app to plan charging along your route.

What Charging Costs around here

	Cost in Central Hudson area	Locations in HV
Home Charging	$0.19 per kwh	
“Destination” Chargers	Usually Free	Hundreds
Chargepoint (Municipal)	Free - $0.25 per kWh (Cost set by charger owner)	Hundreds
Tesla SuperCharger	$0.35 per kWh	14 (most are 250 kW)
Electrify America	$0.31 - $0.43 per kWh	2 (up to 350 kW)
EV Go	$0.30 per minute	27 (most are 50 kW)
EVolveNY	$0.35 per kWh	4 (most are 350 kW)

“Destination” chargers are free L1 or L2 chargers offered by Hotels, parking garages, restaurants, etc.

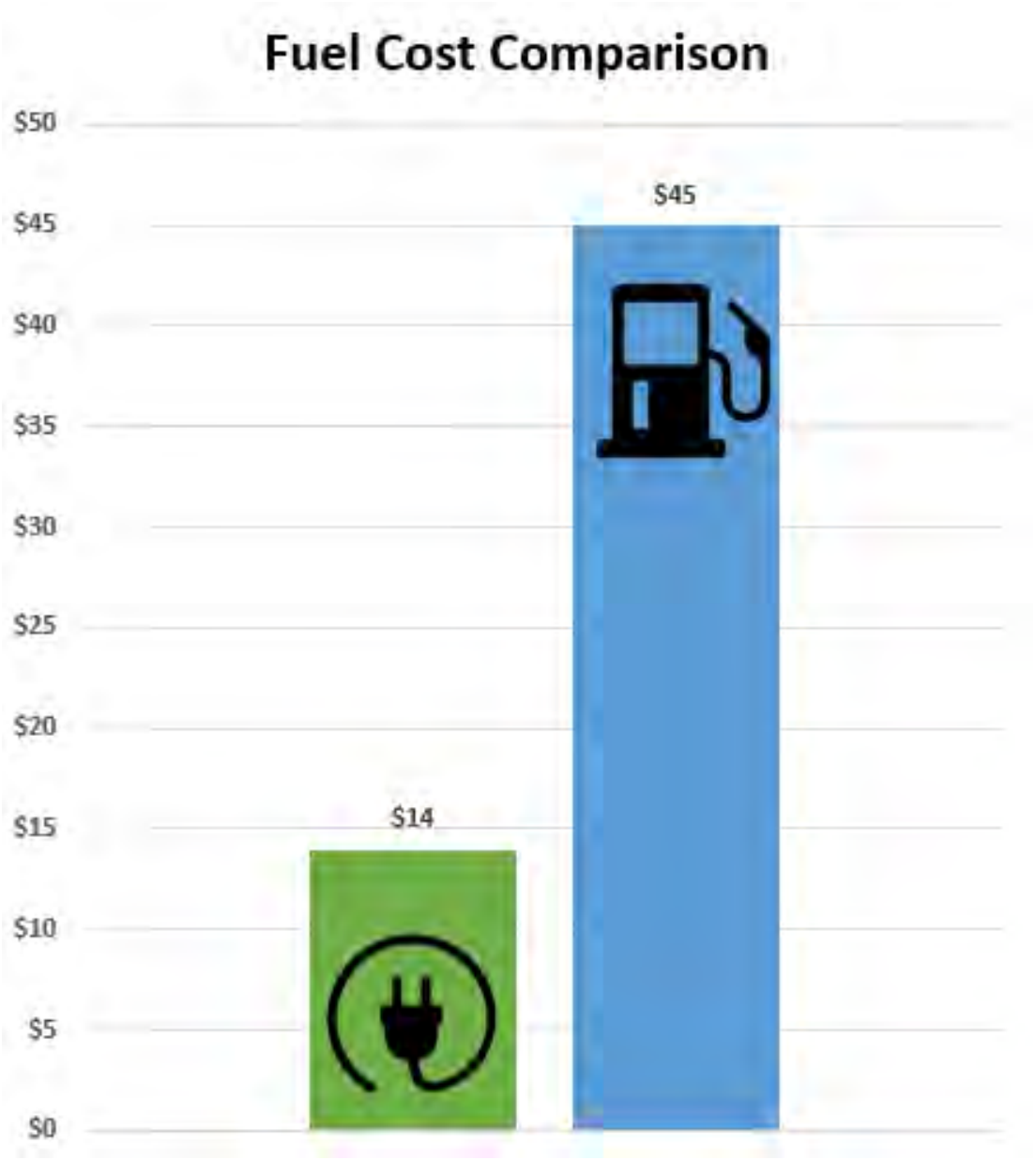
Save Money Driving Electric

Price of Gas	$3.75	Gal
Price of Electricity	$0.19	Kwh
EV fuel efficiency	245	Wh/mile
Gas fuel efficiency	25	MPG
Calculate cost for	300	Miles

	Cost Comparison	
	EV	Gas
300 Miles	$14	$45
EV Fuel Savings	69%	

Save $1,034 per year, driving 10,000 miles.

Source: Steve Wehr spreadsheet



You Can Buy over 35 EVs Today in America

From $26,000 to $140,000

Electric Vehicle Rebates and Incentives

NEW Federal

- $7500 rebate at purchase
- Complex rules for which cars qualify – must have majority North American content.
- $4000 rebate for used EVs

OLD Federal (till 12/31/22)

- $7500 Tax Credit
- Phases out after manufacturer has sold 200,000 vehicles.

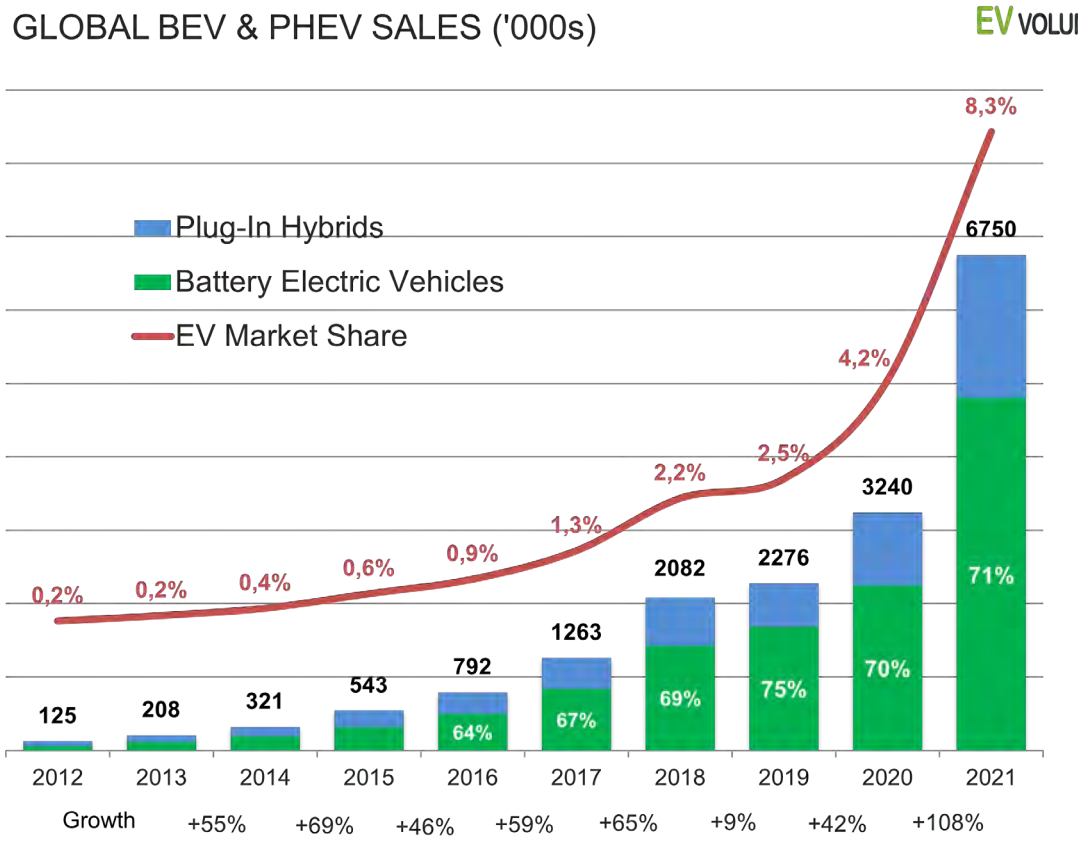
New York State

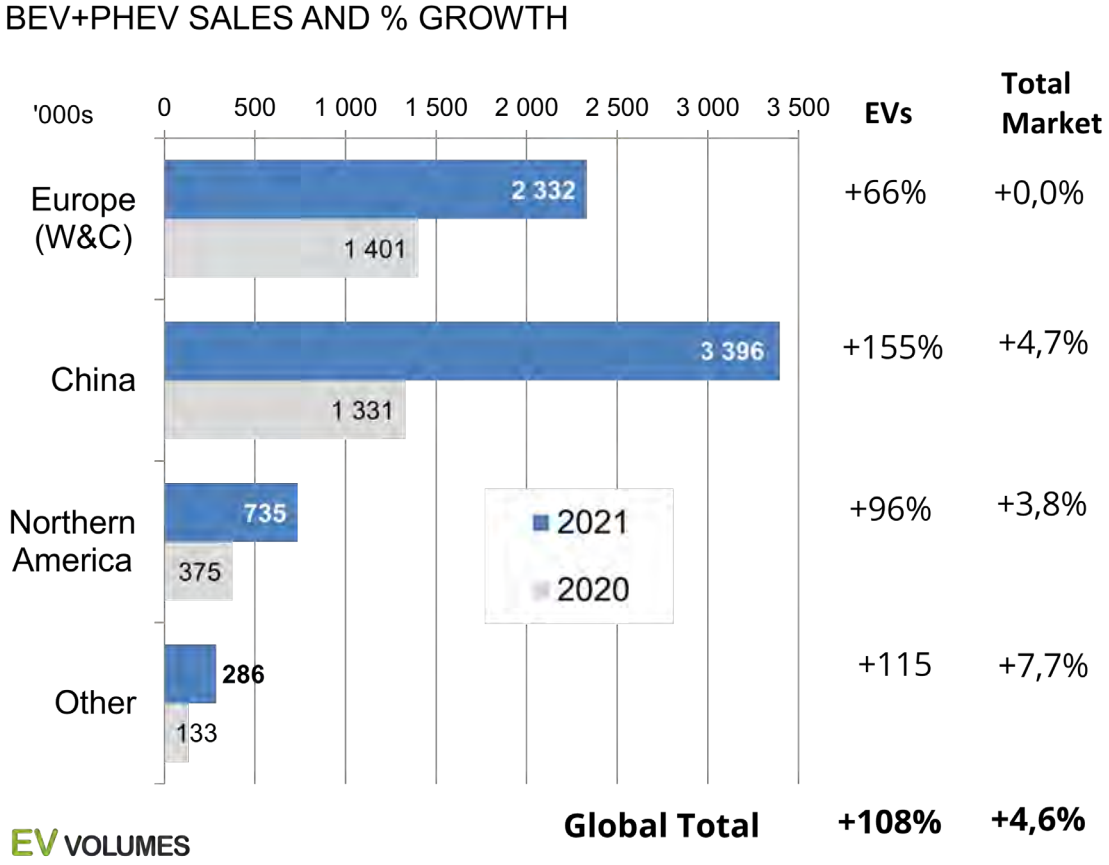
- Google: NYSERDA Drive Clean Rebate.
- Rebate at time of purchase.
- $2000 for >200 mile range vehicles.
- $1000 for >40 mile range vehicles.
- $500 for vehicles over $42,000

2023 Chevy Bolt EV
Starting at $26,000 before rebates

You could get
$9,500 off
Your EV purchase

Electric Vehicle Sales are Accelerating





Globally:

- Many EVs are sold out through YE 2022.
- Overall car market grew 4.6% in 2021. EVs grew 108%.
- EV sales were 9% of all passenger car sales in 2021.
- Another record sales year is coming in 2022.

Questions?