

For those who want to dig deeper ...

Introduction to EV Ownership

A series of YouTube videos, *Maddie Goes Electric*, provides a fun intro to EV ownership. Follow Maddie (a real person) as she chooses her first electric vehicle, takes ownership, learns about charging at home and on long trips, and more. The details are aimed at a British audience, but the overall experience is accurately conveyed to a U.S. audience. Here is the link to *Part 1*.

https://www.youtube.com/watch?v=9A4ytljB-jo&feature=emb_logo

Five Top Reasons to Consider an Electric Car

<https://www.nyserda.ny.gov/All-Programs/Programs/Drive-Clean-Rebate/About-Electric-Cars>

Customer Satisfaction:

Key Findings from 2021 JD Powers Study

Driving enjoyment: While driving enjoyment was higher for premium BEV owners, *virtually no owners would consider again purchasing a gasoline vehicle.*

It's mostly about range: *The most-often-cited factor in the purchase decision is driving range.* After purchase, range remains a critical element of the ownership experience.

Where to plug in: *Satisfaction with the availability of public charging is 305 points higher among Tesla owners than among owners of other brands.*

Show me the savings: For all EV owners, *total cost of ownership is a key driver in the purchase of an EV* that typically has fewer parts to maintain, has less frequent service requirements and results in lower fuel costs than ICE vehicles.

For more on the study results:

<https://electrek.co/2021/01/22/survey-shows-ev-owners-not-go-back-to-gas-brand-loyalty-bit-fickle-tesla-leads/>

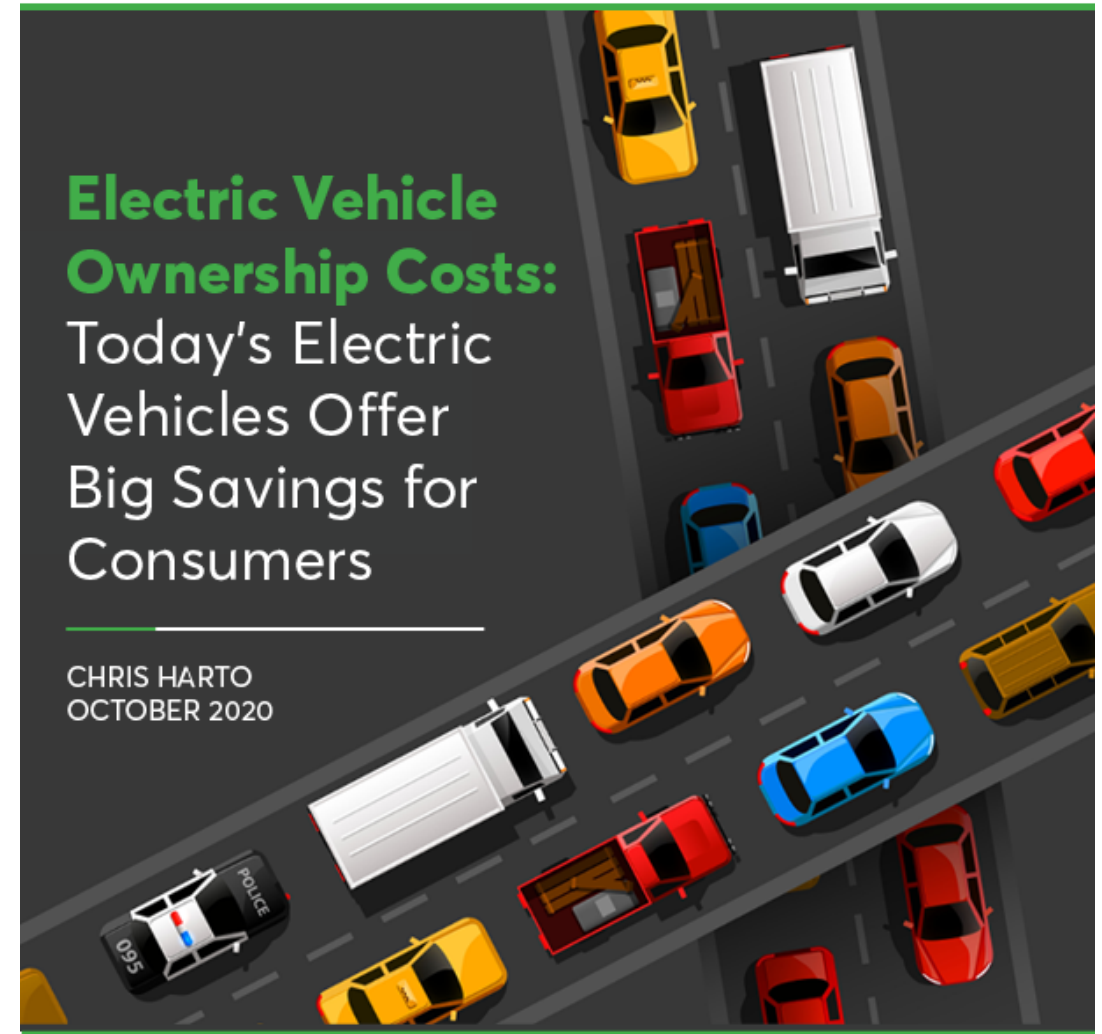
Key Findings from October 2020 CR Study

Seven of the nine most popular EVs on the market cost first-time owners less than the best-selling, and top-rated ICE vehicles in their class, while in many cases matching or exceeding the performance of these same ICE vehicles

Lifetime ownership costs for all nine of the most popular EVs on the market under \$50,000 are many thousands of dollars cheaper than the best-selling and top-rated ICE vehicles in their class, with typical savings ranging between \$6,000 and \$10,000.

For much more information, download the full study:

<https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf>



CR Consumer Reports

Tesla vs. Traditional Auto Dealerships:

Very Different Models for Sales and Service

Tesla only sells automobiles direct to consumers, but 48 states have laws that ban or in some way limit manufacturers from selling directly to consumers. (10 states have outright sales bans; 8 states limit the number of sales locations.) *New York limits Tesla sales to 5 locations, most of them in the greater NYC area.*

Independent dealerships typically earn more money from service than from sales, so the lower maintenance requirements of electric vehicles can provide a financial disincentive to selling EVs. Investigations by [Consumer Reports](#) and the [Sierra Club](#) found that independent dealers often could not answer questions about electric cars, did not provide information about government rebates, did not showcase the cars prominently, or let the batteries run out.

Source: Wikipedia https://en.wikipedia.org/wiki/Tesla_US_dealership_disputes

Note: This situation is slowly improving. Some state legislatures are changing their laws to allow direct-to-consumer sales by auto manufacturers such as Tesla, Rivian, and others, that do not market through independent dealerships. At the same time, the traditional auto manufacturers are pushing their dealers to invest in and develop competency in EV marketing and repair and maintenance.

Are Electric Vehicles Truly “Green”?

Everything we currently manufacture has a carbon cost, but recent studies show the lifetime carbon cost of building and operating an electric vehicle is *much* less than that of an internal combustion engine vehicle.

https://www.oliver-krischer.eu/wp-content/uploads/2020/08/English_Studie.pdf

Five reasons *some* earlier studies came to more pessimistic conclusions:

1. **Exaggerate GHG emissions of battery production**

Economies of scale and smarter engineering have dramatically lowered the energy that factories require to produce battery cells. At the same time the electricity used is steadily decarbonizing.

2. **Underestimate battery lifetime**

Empirical data shows modern batteries will most probably last for more than 300,000 miles. New studies claim over 1 million miles is possible with current technology.

3. **Assume electricity will not get cleaner over the lifetime of the car**

Just as the electricity mix has changed dramatically over the past 20 years, it will change over the next 20 years.

4. **Use laboratory tests paid for by manufacturers themselves**

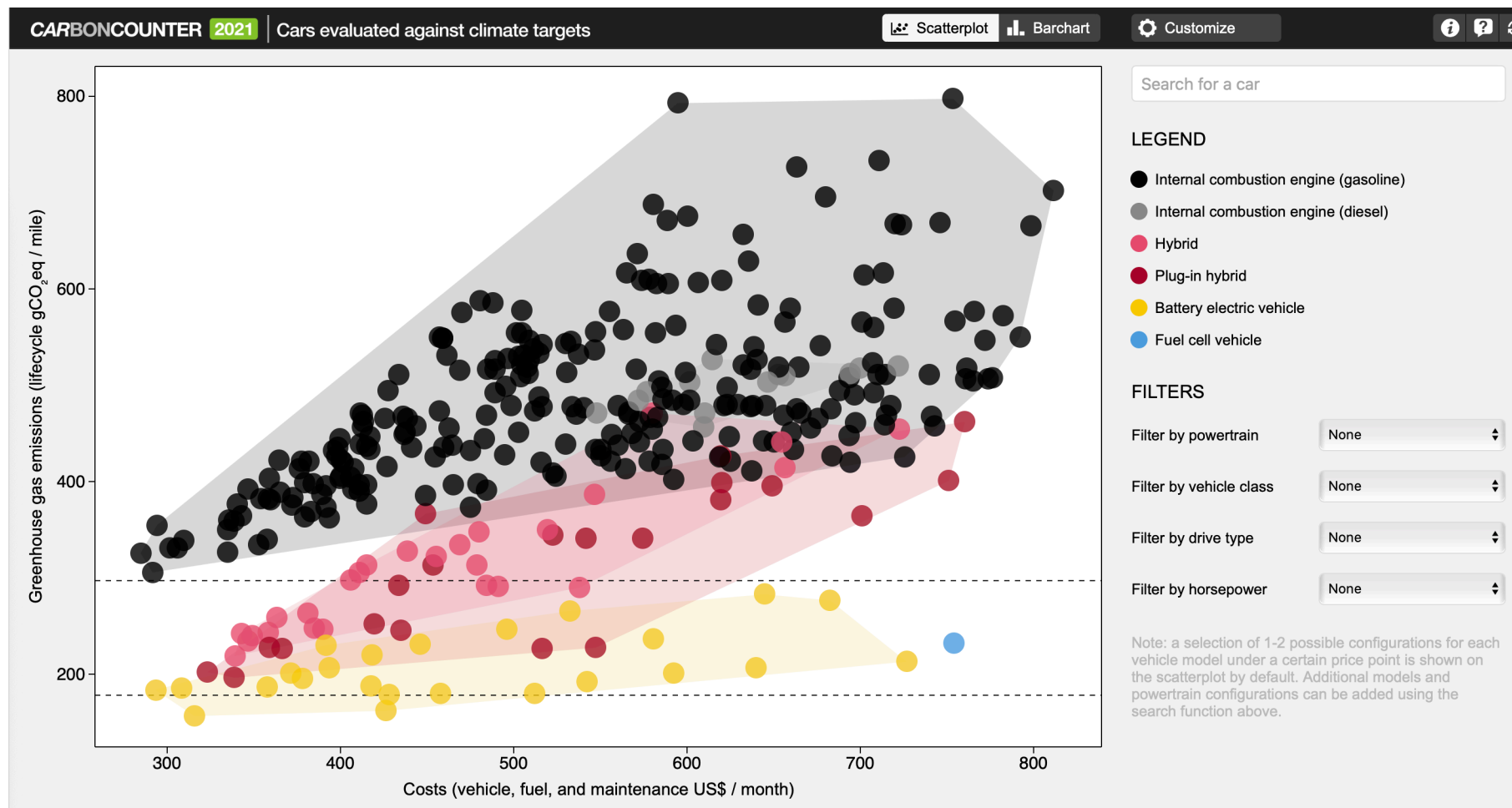
Instead, use CO₂ emissions from independent empirical measurements.

5. **Exclude or downplay fuel production emissions**

New research into well-head flaring and other sources of GHG emissions shows that the emissions related to the production of gasoline and diesel are larger than previously thought. To account for the production of fuel, cars driving on gasoline should add 30% to their tailpipe emissions.

Explore cost of ownership versus carbon footprint!

<https://www.carboncounter.com/#!/explore>



The methodology behind this interactive tool is explained in a research paper: <http://pubs.acs.org/doi/abs/10.1021/acs.est.6b0017>

Wait! Won't there be a shortage of lithium?

Not in the long term!

- Comparable in abundance to copper, chromium, zinc, and nickel – all currently mined in far greater quantities than lithium
- Found on all continents in concentrations suitable for mineral extraction

As electric transportation matures, recycling will limit the demand for newly-mined battery materials such as lithium, nickel, and cobalt.

- *JB Straubel's Redwood aims to extract lithium, cobalt and nickel from old smartphones*
[Financial Times](#), September 17, 2020
- *Li-Cycle To Build Li-ion Battery Recycling Hub In Rochester, New York*
[INSIDEEVs](#), September 18, 2020

Range and Efficiency

EPA Range may over- or under-estimate real world results.

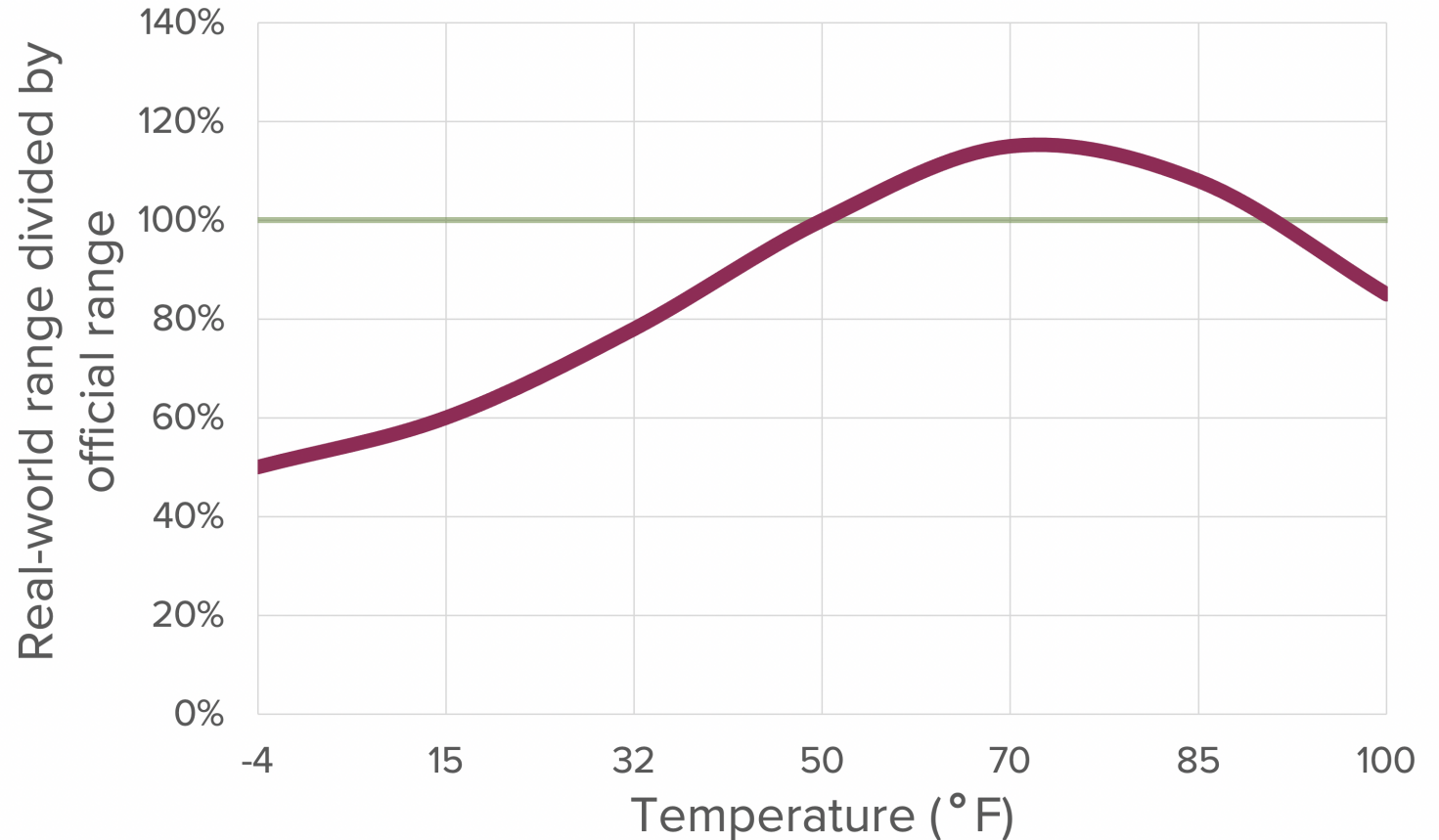
https://www.edmunds.com/car-news/electric-car-range-and-consumption-epa-vs-edmunds.html?cjevent=2df050ef6cac11eb814a01000a24060b&mktid=cj260233&utm_campaign=auto_br&utm_medium=affiliate&PID=8164184&kw=flexibletexttool&SID=k11cja11nq002cim001ol&utm_term=2470763_VigLink&mktcat=affiliates&AID=10364102&utm_source=com_mission_junction

	Range		Consumption	
Vehicle	EPA estimated	Edmunds tested	EPA estimated	Edmunds tested
2020 Hyundai Ioniq Electric	170 miles	202 miles (+18.9%)	25 kWh/100 mi	20.8 kWh/100 mi (+16.8%)
2020 MINI Cooper SE	110 miles	150 miles (+36.5%)	31 kWh/100 mi	21.8 kWh/100 mi (+29.7%)
2019 Hyundai Kona Electric	258 miles	315 miles (+21.9%)	28 kWh/100 mi	22.3 kWh/100 mi (+20.4%)
2020 Tesla Model 3 Standard Range Plus	250 miles	232 miles* (-7.2%)	24 kWh/100 mi	23.0 kWh/100 mi (+4.2%)
2020 Kia Niro EV	239 miles	285 miles (+19.2%)	30 kWh/100 mi	25.3 kWh/100 mi (+15.7%)
2020 Chevrolet Bolt	259 miles	277 miles (+6.9%)	29 kWh/100 mi	25.7 kWh/100 mi (+11.4%)
2020 Nissan Leaf Plus SL	215 miles	237 miles (+10.2%)	32 kWh/100 mi	27.1 kWh/100 mi (+15.3%)
2020 Tesla Model Y Performance	291 miles	263 miles* (-9.6%)	30 kWh/100 mi	29.6 kWh/100 mi (+1.3%)
2018 Tesla Model 3 Performace	310 miles	256 miles* (-17.4%)	29 kWh/100 mi	30.1 kWh/100 mi (-3.8%)
2020 Porsche Taycan 4S	203 miles	323 miles* (+59.3%)	49 kWh/100 mi	32.3 kWh/100 mi (+34.1%)
2020 Tesla Model S Performance	326 miles	318 miles* (-2.5%)	35 kWh/100 mi	32.6 kWh/100 mi (+6.9%)
2021 Ford Mustang Mach-E AWD Ext Range	270 miles	304 miles (+12.6%)	37 kWh/100 mi	33.1 kWh/100 mi (+10.5%)
2020 Tesla Model X Long Range	328 miles	294 miles* (-10.4%)	35 kWh/100 mi	35.0 kWh/100 mi 0.0%
2021 Polestar 2 Performance	233 miles	228 miles* (-2.1%)	37 kWh/100 mi	35.2 kWh/100 mi (+4.9%)
2021 Audi e-tron Sportback	218 miles Thomas Theis	238 miles* (+9.2%)	44 kWh/100 mi	38.2 kWh/100 mi (+13.2%)

Driving Range Depends on Temperature

If you take many long winter trips, consider spending more for a longer range vehicle.

Average Real-World Range vs Official Rated Range



Source: <https://www.driveelectricvt.com/winter>

Leading Causes of Bird Deaths

Habitat destruction due to agriculture, deforestation, and urbanization is by far the greatest cause of bird population declines.

Additional causes are shown in the graph at right, from [The State of the Birds 2014](#) report of the U.S North American Bird Conservation Initiative.

Climate Change

About two-thirds of America's birds will be threatened with extinction if global warming rises by 5.4 degrees Fahrenheit by 2100, according to a [report released](#) by the National Audubon Society.

