Are you EV curious?

A personal ownership perspective

For those considering choosing, buying, owning, and/or maintaining an electric vehicle for their next car.

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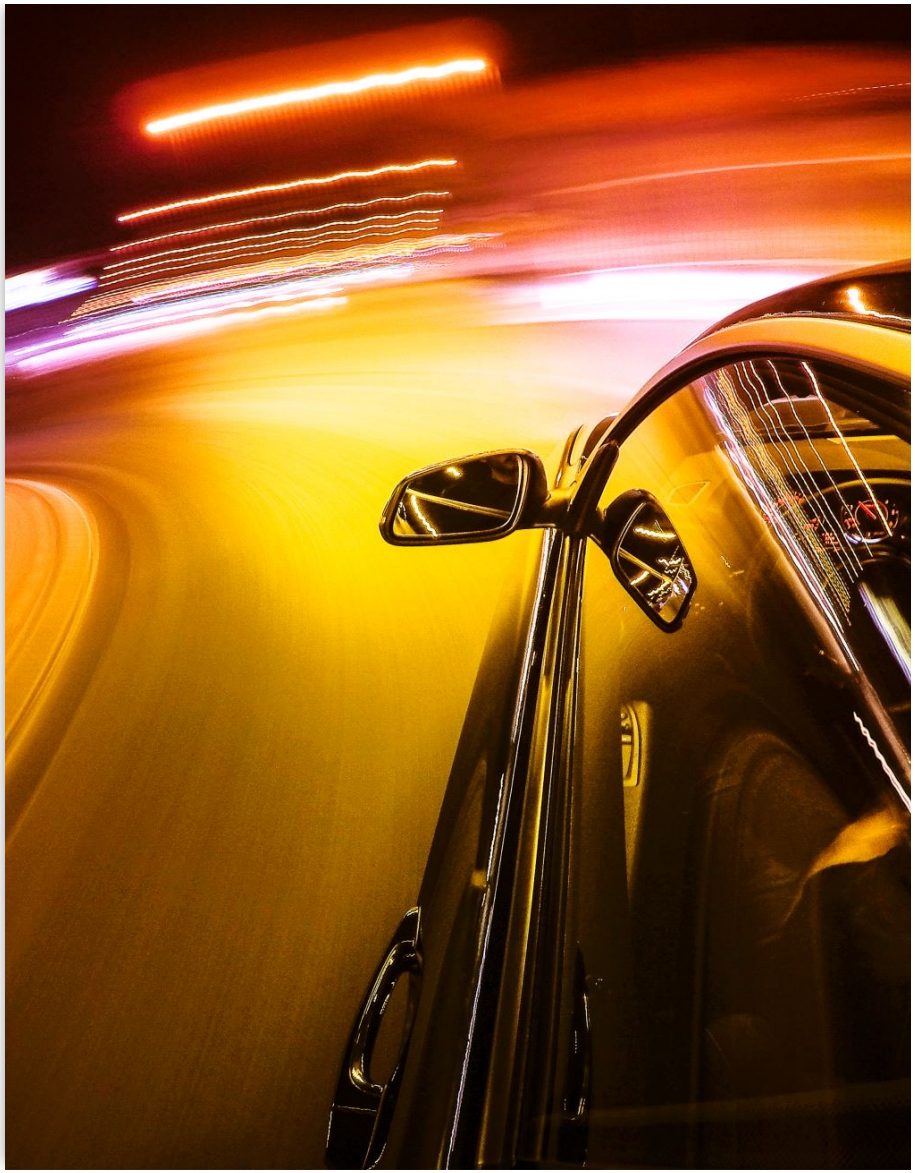
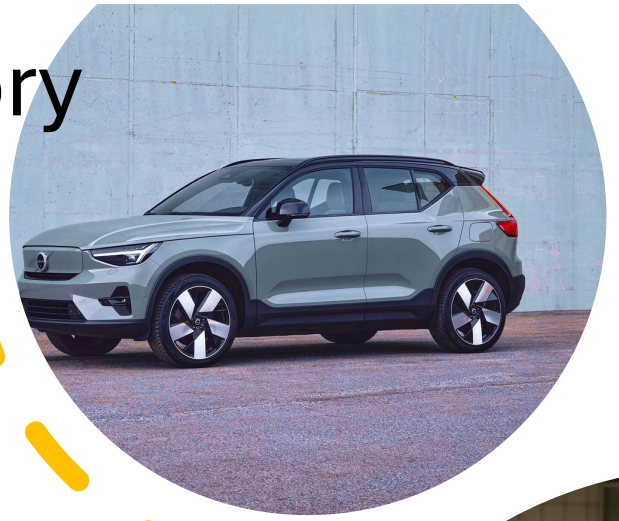
Agenda

- My personal car history
- What kinds of EVs are there?
- Why is (was?) Tesla so darn special?
- Why do I own an EV?
- What does the current market look like?
- How should I choose an EV?
- Concerns:
  - Cost
  - Battery degradation and life
  - Charging, range, and infrastructure
  - Repairs and maintenance
  - Should I wait?
  - An EV is NOT for you if…
- I want to learn more—where can I go?



My Personal Car History



- Car enthusiast since late HS/college—hot hatches, small-turbo charged engines—never could afford the cars I really wanted.
- 70s oil embargo had a big impact on my thinking (cost, efficiency)
- Owned lots of cheap/practical cars—Renault Alliance, world's only front-wheel drive Subaru, Ford Focus wagon.
- VW Golf TDI diesel wagon + dieselgate = Volvo V60 wagon
- Most fun car > VW Tiguan (2010) "Golf on stilts" until my newest purchase.
- Leased Prius Prime PHEV 2021-2024 (fun, sorta).
- Purchased 2021 CPO Volvo XC40 Recharge EV Feb-2024 (MOST fun car)

What Kinds of EVs are There?

- **Hybrid (HEV)** – A small battery is used to capture braking energy and use it for faster starts and/or supplementing the drive of the gas engine (greater fuel economy). Developed in 1997. (Toyota)

- **Plug-in Hybrid (PHEV)** – A battery large enough to support electric-only trips from 10-100 miles. Supplemented with a gas engine in a variety of powertrain architectures. Developed in 2009. (GM)
  - **Pros**: Total trip range (road trip), ease of fueling
  - **Cons**: Less storage, space than comparable vehicles (battery + engine)

- **Battery Electric Vehicle (BEV or EV)** – Battery electric only drivetrain (no gas engine) with ranges from 100-500 miles. Developed in 2008. (Tesla)
  - **Pros:** Acceleration, efficiency, pollution
  - **Cons**: Public charging infrastructure, long-distance towing cost

Why is (was) Tesla so darn special?

Tesla was first-mover in EV market with holistic approach to:

- Purchase process
- Technology/Design
- Ownership
- Maintenance
- Charging

- Purchase process – Simplified offerings, all online, no pressure, haggling, crazy fees. Like shopping on Amazon including delivery.
- Technology/Design – Minimalist, screen/voice driven, automated functions, new functions (frunk, camp mode, dog mode, watching movies, “full self-driving”, etc.)
- Ownership – Continuous improvement in functions and addition of features through over-the-air updates
- Maintenance – Remote and on-site service model controlled through app.
- Charging – Funding, building, maintaining the best, most reliable charging network with additional features promoting ease of use

Price volatility, new product stagnation, and competition has led to a slowdown in global sales.

Why Do I Own an EV?

- Quiet and smooth – No engine noise or revs, no transmission shifts.
- FAST – Immediate torque.
- No tailpipe pollution, no carbon monoxide – Can remote start in my garage and warm/cool it to perfect temperature.
- Fueling it not tied to the whims of OPEC or other actors. Can charge overnight for a full tank everyday.
- No oil changes, exhaust system repairs, or oil leaks.

Stay Tuned: Will cover CONCERNS in a couple of slides…

What does the Current Market Look Like?

- COVID (US) – Fewer, higher-end cars produced (>10 million gap vs pre-COVID) > +20% avg transaction price > Manufacturers and dealers don't want to let go of pricing and profit.
- Affordability crisis – interest rates, sales saturation at the upper levels > increasing dealer inventory, slowing production and/or driving manufacturers to more affordable models
- Emission requirements for China, Europe, UK, (and US?) driving some legacy automakers (internal combustion) out of these markets.
- Repatriation of China auto market > downward price competition between China and everybody else (EVs)
- Used car market depreciating (especially EVs) due to price premiums charged in past along with "technology turnover".
- **(Jun-2024) Used EV's $2,500 less on average--if you are planning to purchase (and hold) a used EV, now is a GREAT time for it!**

How Should I Choose an EV?

1. Select the type of vehicle you need just like any other car: SUV, sports car, truck, wagon

2. Trip	PHEV - EV Mode (>25mi range)	City EV (<150 mi range)	Regional EV (>200 mi range, >=40 min 10-80%)	Interstate EV (>300 mi range, <30 min 10-80%)
Daily commute <30 mi	Not applicable for PHEV in EV only mode.			
Daily commute <200 mi				
Road trip <500 mi (2-3x/yr)				
Road trip <500 mi (1/mo)				
Road trip >500 mi (2-3x/yr)				
Road trip >500 mi (1/mo)				
Towing/hauling <100 mi				
Towing/hauling <500 mi (2-3x/yr)				
Towing hauling <500 mi (1/mo) OR Towing/hauling >500 mi				

Legend	
	No charging stops needed
	Destination or one charging stop needed
	Route planning needed
	Not recommended--not a good experience

Concerns

- Cost
- Battery degradation and life
- Charging, range, and infrastructure
- Repairs and maintenance
- Should I wait?
- An EV is NOT for you if…

Concern: Cost

Buy Used / Certified Pre-Owned

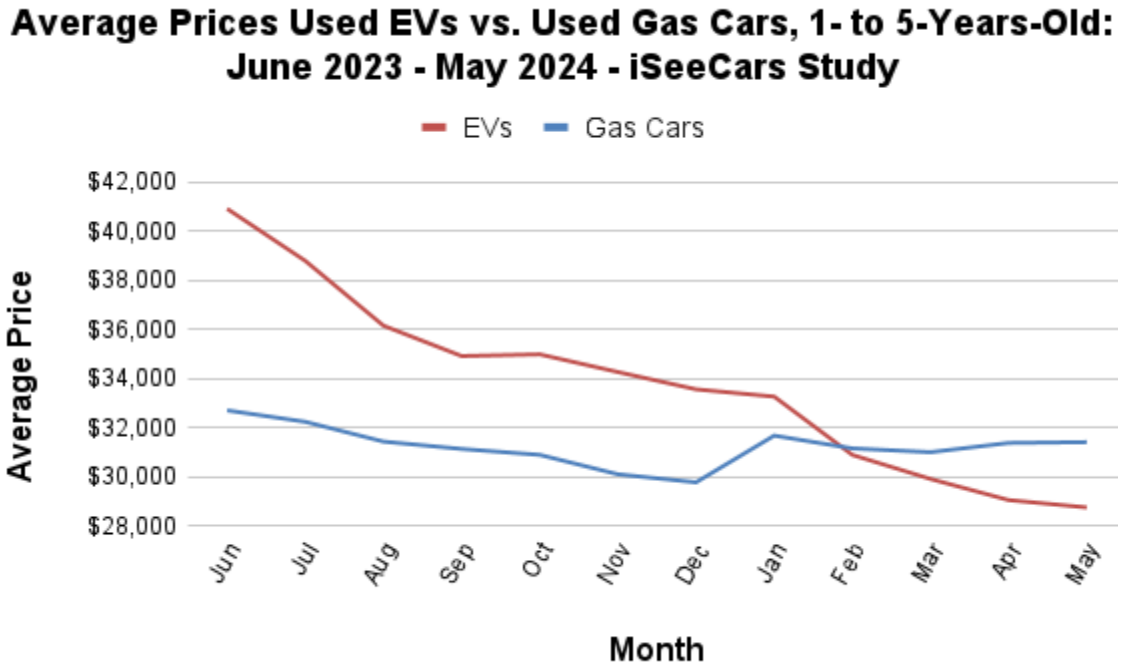
- Early in technology adoption, used electric cars resemble used car market from 10-15 years ago. A 3 year old car can be had for a relative bargain.
- Used electric vs combustion cars (1-5 yrs old) NOW CHEAPER by $2,000 on average!) with 55% under $30,000.

Lease

- Hyundai/Kia particularly aggressive
- Tesla, Ford, GM
- "Try before you buy" (see Should I Wait?)

New Purchase

- Average Transaction Price (ATP) EV within $2K today, coming down. Lots of incentives and deals now. New affordable models will be cheaper than internal combustion ATP ($48K).



Concern: Battery Degradation and Life

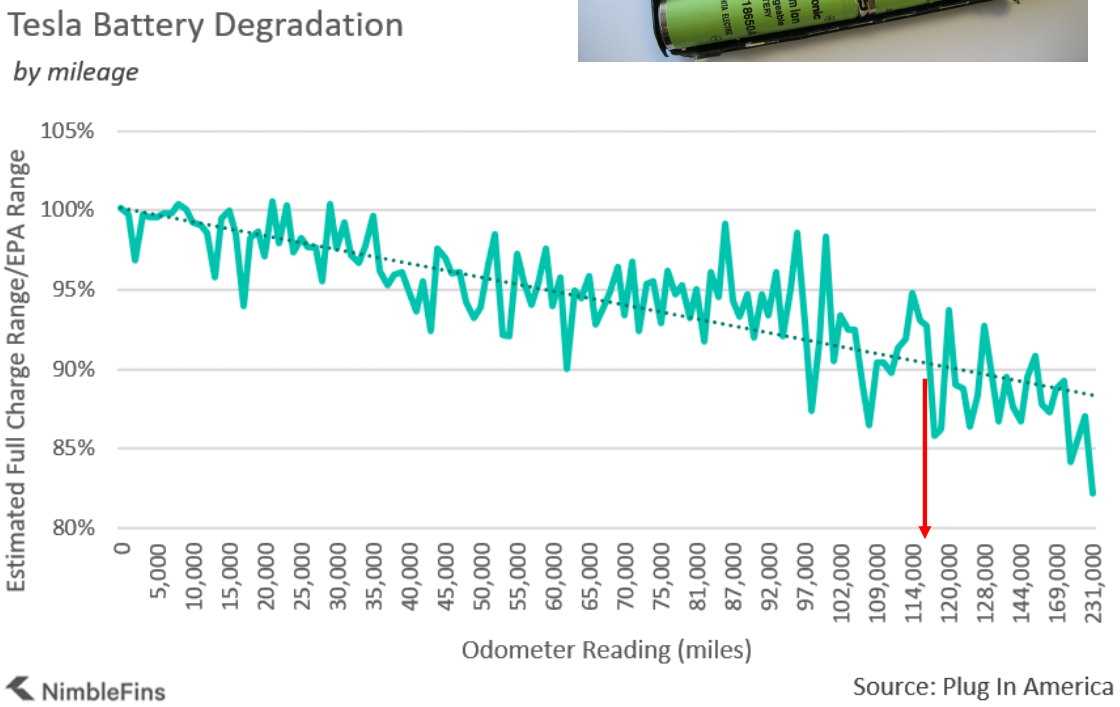
- Battery failure is rare (think engine/transmission failure)—warranty covers 8 yr/ 100K mi or more.
- Degradation proven to be low.
- If buying used, can use service mode or other options to assess battery health.

Buy LFP

- LOVES 100% daily charging, no critical minerals, safer.
- Downside: limited availability (some Ford Mustang Mach-E, Tesla Model 3

Charge Limit

- Daily/Around Town: Charge up to 80-90% (see owner's manual) and allow charge to drop to <50% to recharge.
- Winter: Plug in nightly.
- Road Trip: Charge to 100%.



Concern: Charging, Range, and Infrastructure I

Daily Driving

- Home charging (dryer-outlet*) cheapest option.
- Typical commute is 40 mi/day.
- Cost: XC40 $520 (EV) vs $1610 (Gas) (0.10/KWh / $3.40/gal)

Road Trips

- Non-Tesla network is fractured (payment, accounts, etc.) and reliability is so-so (improving).
- Tesla network is large, well-run, and reliable and has opened up many (NOT all) sites to non-Tesla cars.
- This will improve significantly over the next 2-3 years.

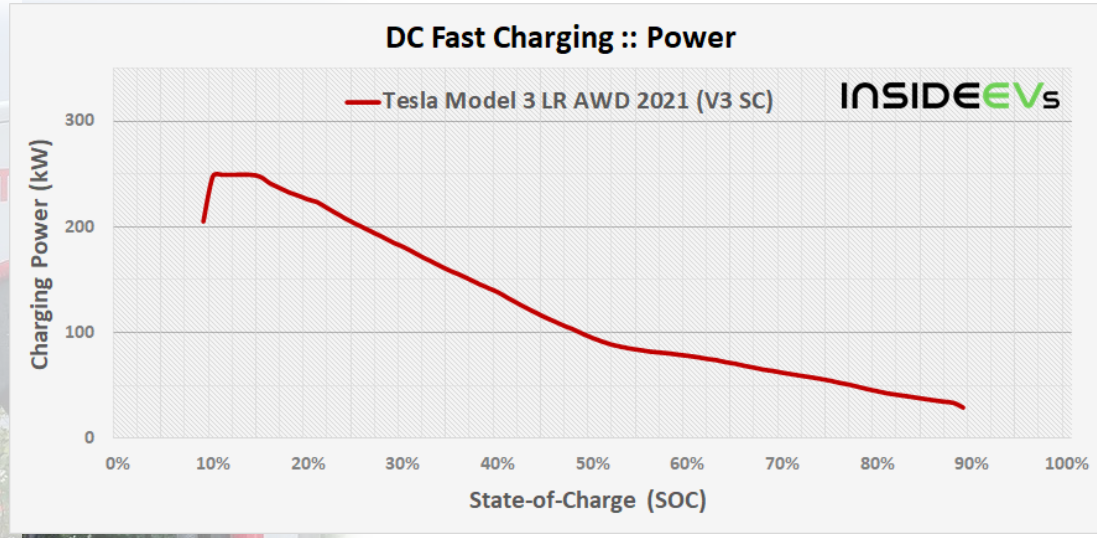
Is range the REAL concern?

- For daily driving with home charging-–NO. You COULD plug in every night and have a full 200-300 mi range every morning if needed.
- For daily driving WITHOUT home charging—MAYBE. If you live in suburban or urban area, you will generally have access to charging such that topping off your car is relatively easy, but planning is required.

Concern: Charging, Range, and Infrastructure II

Tips & Tricks

- **Use the nav, use the nav, use the nav.** Pre-conditioning the battery prior to charging (particularly in the cold) will optimize the charging rate and experience.
- **In CNY winter, plug in every night.** Pre-condition the battery prior to leaving through the car's app.
- If available, reduce or remove one-pedal driving on very snowy or icy roads. This will result in better, more-predictable handling.
- **240V charging cable** vs wallbox is a cheaper option and will work for most people. NOTE: This will limit charging rate to 9.6KW vs 11 or 19.2 KW (only makes sense for trucks with large batteries).
- If you are a dedicated road tripper get familiar with the networks most available on your routes.



•Charge to 100% the night before and use as much of that charge as possible before stopping to recharge (<20%). Stop charging at 80%.
•Pick the right charger for your car. 350KW charger will only charge at 50KW on a Chevy Bolt…

Concern: Repairs & Maintenance

- Startups – Tesla, Rivian, Polestar – Have limited brick-and-mortar service centers, but do have larger on-site (traveling) service networks.
- Legacy auto – Ford, GM, Toyota, etc. – Extensive service center networks (dealers), but little or no ability to go on-site.
- Battery/motor failure – Consider it similar in frequency to engine failure for gas car.
- Startups and some legacy auto are using EV architecture to keep out 3rd party part suppliers—right to repair.
- With only 10-20% of moving parts of a typical gas car, EV's should be the more reliable choice.
- Tires? Take it easy on the accelerator…
- No oil changes, fewer brake replacements, no exhaust or emissions systems issues.

Concern: Should I Wait?

- Battery technology – YES if you need rapid charging due to frequent long-distance road trips (>600 miles).
- In-car technology – NO. Most cars offer over-the-air software updates and feature upgrades.
- Autonomy – MAYBE. Only Mercedes has a (limited) system allowing you to take eyes off the road. Ford/GM/Tesla have systems which require constant attention. Some of these are upgradeable, but it is unclear whether these systems are complete enough to support fully autonomous driving.
- Vehicle-to-load/vehicle-to-grid – MAYBE. Some cars have this capability (Hyundai//Kia, Ford Lightning) and some may be able to upgrade to it with software.
- Towing – YES if you need to frequently tow long distances (>300 miles).
- Price – NO. Used/CPO and a batch of new lower-cost EV's are coming to market. Pay particular attention to Hyundai/Kia for new purchase and lease deals. 3 year old used EV's are a BARGAIN right now.

Concern: An EV is not for you if…

- You routinely tow large loads (e.g., 8 feet wide x 8 feet high trailer) distances over 200 miles (1/wk). NOTE: The Silverado EV changes this.
- You live in a rural area with no access to home charging.
- You routinely (1/mo or greater) road trip 600 miles (one way) or more if you like to drive without stopping and/or do not derive any satisfaction from driving electric vs gas.

An EV is a no brainer if…

- You have access to home charging and travel regionally (200-500 miles).
- You want a large SUV or other large vehicle that you do not use for long-distance towing.

I Want to Learn More—Where do I go?

- Edmund's EV 101 series – Structured step-by-step series
- Insideevs EV 101 series – More general information, varied topics, and deep dives.
- EV Resource – Great general information website and informative podcast on electric vehicles and green energy topics.
- EV Rebates and incentives: Federal (IRS.gov) and NY State (NYSERDA)
- Plugshare, A Better Route Planner are good tools for this. NOTE: NY has a dedicated EVolve charging network along the Thruway and other major routes (https://evolveny.nypa.gov/).
- Good websites to use for car shopping:
  - cars.com (EV range filter)
  - caredge.com (research tools, concierge service)
  - do NOT recommend purchasing through Hertz due to excessive use in Uber ride sharing