INFORMAL – NON-PEER-REVIEWED SEMINAR ON ELECTRIC VEHICLES (MAINLY TESLA 3) by Corrie Kost

Discussion Topics for Electric Vehicles:

A. **Price of EV's (Teslas)**
B. Charging – home and/or away – times, costs, availability
C. Range (vs speed and ambient temperatures)
D. Drivability & Habit adjustments
E. Driving in the Snow – Regenerative Braking Issues
F. Winter or All-Season tires for winters
G. **A**ll **W**heel (AWD) vs **4 W**heel (4WD) vs **R**ear or **F**ront **W**heel **D**rive (RWD/FWD)
H. Overall User Experience
I. Software Updates
J. Warranties
K. Maintenance Schedules Costs & Battery Life and Environmental/Disposal issues Costs / Tires
L. Primary & Supplementary Insurance
M. Autopilot Vs Full Self Driving
N. Global Legislation to Phase Out Internal Combustion Engines (ICE)
O. Other Issue**s**

VERY LIMITED PRIORITY FEEDBACK YIELDED ONLY ONE CLEAR WINNER – A ie. Price

A,C,J) Price/Warranties/Specs of TESLA 3

Tesla 3: Rear-Wheel Drive: **423km** 255km/h 0-100km/h 5.6s

Long Range all-wheel drive **568km** 233km/h 0-100km/h 4.4s (**3.7s** with $2.7k extra)

Performance Dual Motor all-wheel drive **507km** 261km/h 0-100km/h 3.3s

https://www.ccarprice.com/ca/tesla-model-3-long-range-2022-price-in-canada-6645 - updated daily

Long Range AWD: $65,610* 134/126/131MPGE City/Highway/Combined **449hp**

Standard RWD: $58,610* 138/126/132MPGE City/Highway/Combined 282hp

Performance: $75,610* 118/107/113MPGE City/Highway/Combined 480hp

Basic & Roadside assistance: 4 yrs 80,000km

Corrosion: 12yrs unlimited miles

Higher MPGE is better. Alternatively kWh/100km (combined 15.6 for Long Range) then smaller is better.

Drivetrain: 8 yrs 192,000 km (LR &Performance) 160,000 (Standard)

Battery: Min 70% of original range for all model 3's **at Drivetrain limit**. **But warranty replacement will only require that replacement meet 70% threshold when replaced!**

New Vehicle Limited Warranty will follow your vehicle and be transferred to the new owner. The **upgrade cost** from the Tesla 3 model RWD to the Long Range Dual Motor AWD (also having faster charging) may be worth the investment.

(*) 4th Quarter 2021 Total Price for my Tesla 3 Long Range, w. white premium interior **$76,245**

References:

Car & Driver https://www.caranddriver.com/tesla/model-3

https://www.evspecifications.com/en/model-driving-range/1af7111

Comparison of Tesla Model 3 or Y with other EVs
https://insideevs.com/news/567158/model-y-comparison/

Tesla Model Y chosen Best Electric Vehicle of 2022
https://www.cars.com/articles/best-electric-vehicle-of-2022-445835/

On EV Batteries
https://elements.visualcapitalist.com/ranked-top-10-ev-battery-makers/
https://elements.visualcapitalist.com/lithium-prices-surge-on-ev-demand-from-china/
https://elements.visualcapitalist.com/breaking-down-the-cost-of-an-ev-battery-cell/
https://elements.visualcapitalist.com/how-metals-prices-performed-in-2021/
https://elements.visualcapitalist.com/visualizing-the-natural-graphite-supply-problem/
http://www.northerngraphite.com/_resources/media/NGC%20Spotlight_Compressed%20Version.pdf

Best overall reference (but dated)
http://roperld.com/science/TeslaModel3.htm

B1)Charging – Home&Away options – efficiency/times/costs/availability

Home: See slide "Wall Connector Technical details" below for charging rate.

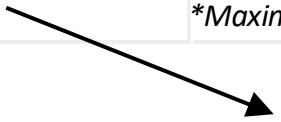
In BC the cost is currently $0.0935 for ~ first 1376 kWh in two months and $0.1403/kWh over the ~1376kWh total.) Recent Tesla app shows "Charge Stats" for the past month. For some details/cost on home chargers see link below.

https://nahbnow.com/2021/04/pre-wiring-for-electric-vehicle-charging-prepping-your-homes-for-future-demand/

Efficiency: According to 2021 Tesla Model Y certification data mentioned in article https://www.caranddriver.com/features/a36062942/evs-explained-charging-losses/ it took 87.9 kWH to add 77.7 kWH to battery from 0 to 100% on the Long Range Model Y using level-2 chargers – **a loss of ~14%**. Efficiency of 400V DC from Superchargers is 98-99%. It appears ~ 21^{C} is optimal charging temperature. In non-sentry mode expect your Tesla to lose 1% in charge as it sits unused. Sentry mode can consume an extra 3%/day.

B2)Wall Connector Technical details ($600) https://www.tesla.com/support/home-charging-installation/wall-connector			Charge Speed Max miles of range per hour of charge			
Circuit breaker (amps)	Maximum output (amps)	Power at 240 volts (kilowatt)	Model S (mph)	Model 3* (mph)	Model X (mph)	Model Y (mph)
60	48	11.5 kW	34	44	30	42
50	40	9.6 kW	29	37	25	36
40	32	7.7 kW	23	30	20	29
30	24	5.7 kW	17	22	14	21
20	16	3.8 kW	11	15	8	14
15	12	2.8 kW	7	11	5	10

**Maximum charge rate for Model 3 Rear-Wheel Drive is 32A (7.7kW) - up to 30 miles of range per hour*



$25 home solution - note 80% rule for max output

B3)

B4) Away: Tesla SuperChargers

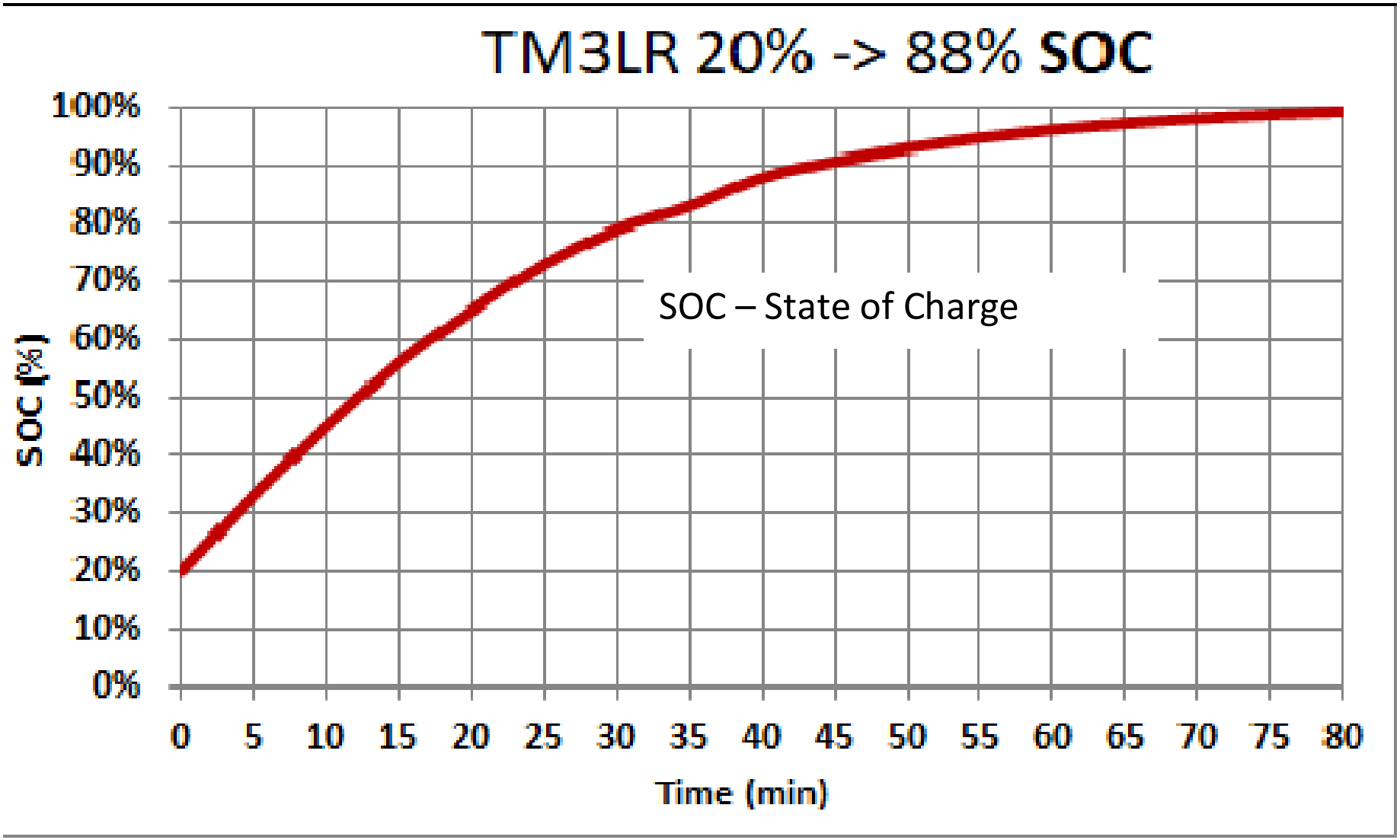
Costs about twice as much per kWh than charging at home. Charging can take as little as 15min from 20% to 80% (about 50kWh) at a 250kW outlet.

Availability is currently limited in BC/AB to northern limit of Prince George, Jasper/Edson, Edmonton, Lloydminster [Hwy 16].

SuperChargers generally come in A/B pairs. Being the only one on a pair allows for almost twice the charging rate. Note that the charging rate slows rapidly when charging past 80% charge levels.

- Console **"Navigation" will optimize trip time for you**. Just enter your destination on console, or from your phone, or speak a voice command for address, business, etc. "Waypoints" can be added to customize your route.
- The vehicle will use its HVAC system to prepare the battery to a temperature that will ensure the best charging experience at successive charging stations.
- Process: Drive into stall backwards. Set the desired charging level on console or phone. Your phone app does automatic authorization. Unhook power cable. Plug it into car. Wait till you get what you need (or not). Unplug cable and return it to hanger. Leave.
- Plan **where** to charge and **how much** and where **next.** Typically "sweet" spot of how much to charge – charging to >80% takes more time/% - charging less means stopping more often but done right the overall trip takes less time. **–Tesla winner of 1000km trip**

B5) This data for SuperCharging a Tesla 3 Long Range is from
https://model3ownersclub.com/threads/request-to-an-owner-supercharging-rate.5427/#post-128114



B6) Charging Etiquette: https://www.evgo.com/ev-drivers/charging-etiquette/ https://www.bchydro.com/news/conservation/2019/ev-charging-etiquette.html

- Take only as much charge as you need to comfortably get to you next station
- Charging spaces are for charging only
- Monitor your charge when away from your vehicle, or at least leave a note
- Do not remove somebody else's charging cable (unless you **see** a note to allow)
- Keep music low & properly dispose of your trash

Note that while the majority of EV owners haven't been involved in an argument at a charging station, or witnessed one, almost a quarter have been in an argument.

Road Taxes – Benefit in Kind (in some places- 1 or 2% of cost of EV/yr) but, for example, London England waives Congestion/Emission charges. https://pod-point.com/guides/vehicles/tesla/2021/model-3

BC Hydro **could** implement 2nd meter channel at homes to charge at a higher $rate/kWh. Technology is available to combat cheating.

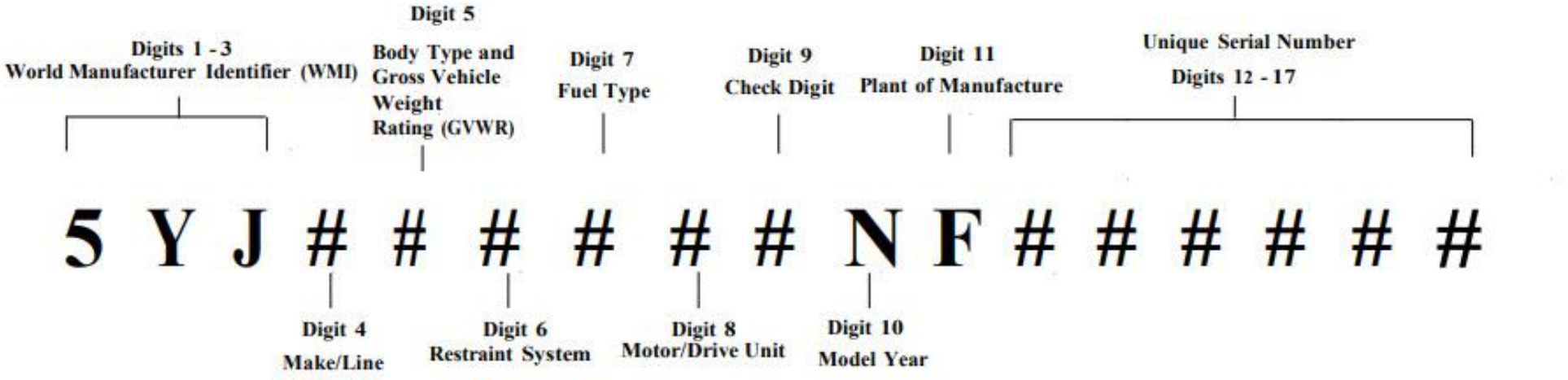
B7) Future: Wireless charging on the go...Copper Coils fitted under the asphalt...

https://www.autoevolution.com/news/sweden-successfully-tests-wireless-charging-road-set-to-revolutionize-mobility-155137.html

"this is something that has not been implemented yet as a factory feature by any renowned carmaker but can be easy and cost-effective to add on existing and future EV models." **Short video s**hows concept at https://youtu.be/8BQUIRBMSWA (taken from https://www.intelligentliving.co/roads-that-charge-electric-cars-wirelessly-springing-up-everywhere/)

TESLA

Vehicle Identification Number (VIN) Explained



C1) Range

In Canada – uses enerGuide L_e/100km

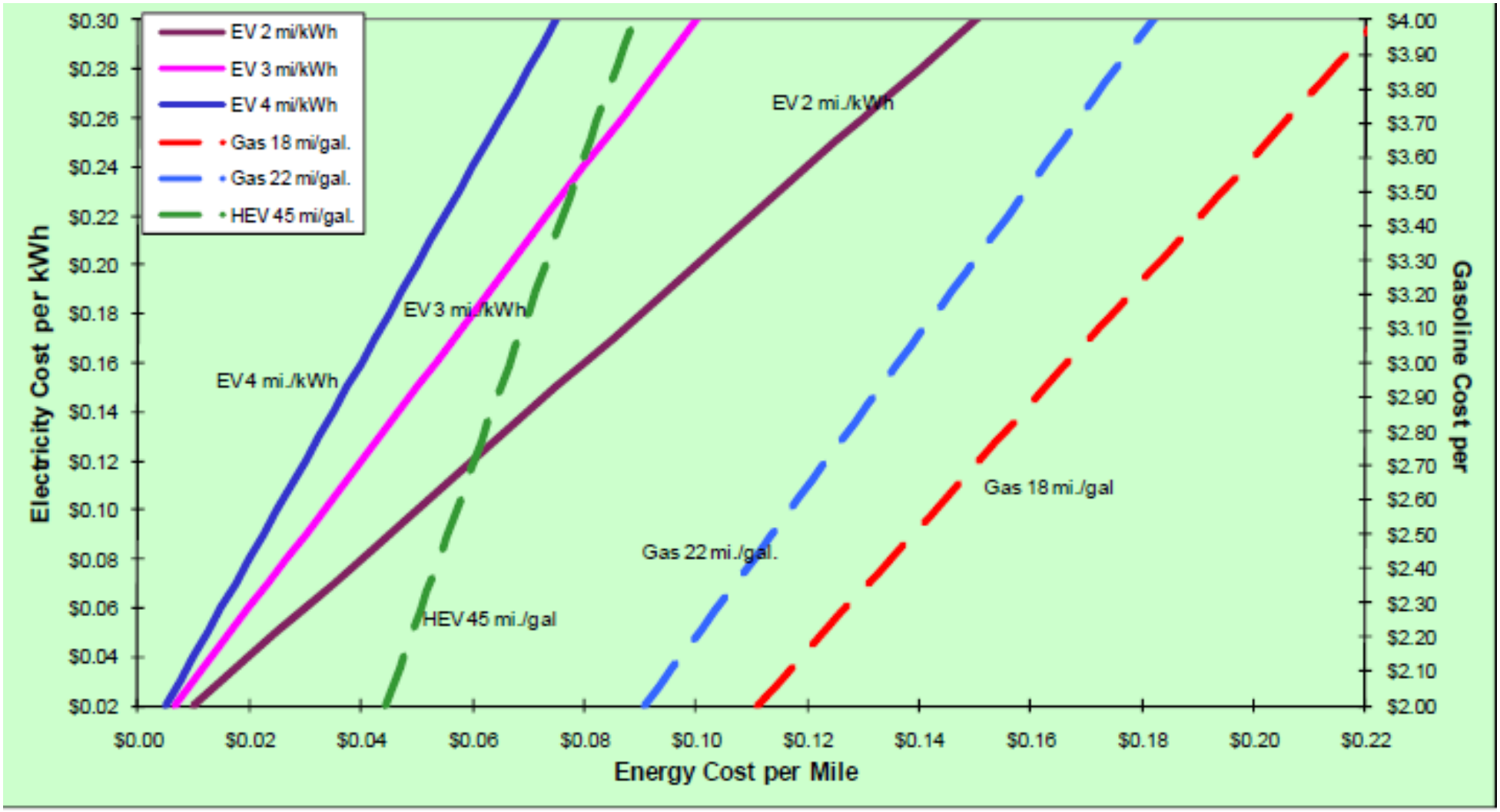
For Tesla 3 LR L_e/100km is 1.7/1.9/1.8 for city/highway/combined. Combined is also shown as 15.6kWh/100km (translates to 4.0miles/kWh)

An EV's efficiency rating, typically expressed in Le/100km accounts for all the energy expended by the vehicle. It's a metric created to compare the energy efficiency of EVs to that of gas-powered vehicles by **showing the energy consumed in terms of litres of gasoline (which is 8.9 kilowatt-hours per litre)[(1)]to travel 100km.**

Of course in BC that energy is supplied by hydro so the CO_2/km is zero here for the Tesla which is given the highest rating[(1)] of 10 (best).

(1) https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/personal-vehicles/choosing-right-vehicle/buying-electric-vehicle/understanding-the-tables/21383

From https://avt.inl.gov/sites/default/files/pdf/fsev/costs.pdf



Energy Cost of 100km trip:

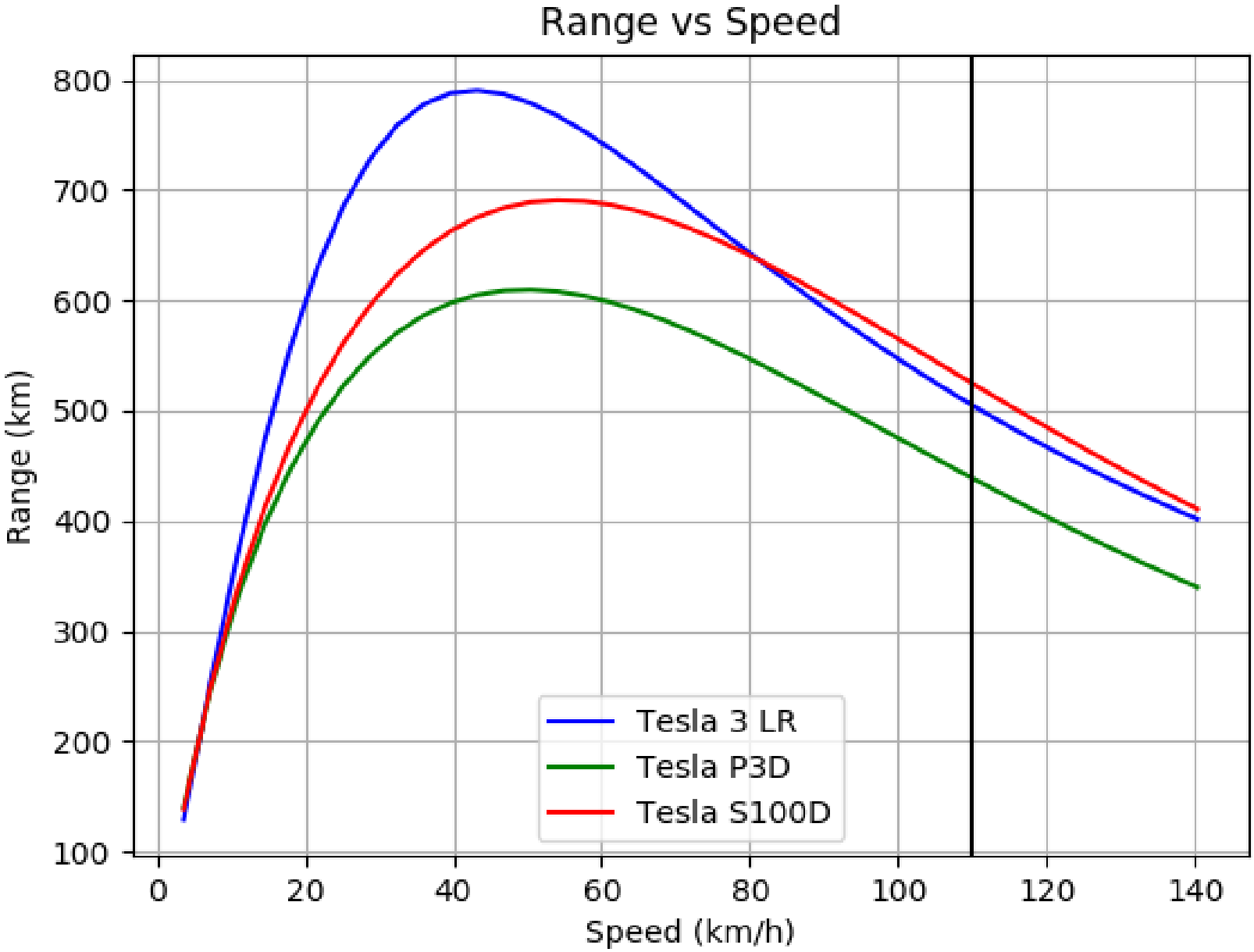
Tesla: combined 15.6kWh/100km at $0.14 = **$2.18** ICE vehicle – say 8 ltr/100km →**$15.60** at $1.95/ltr

Using Tesla rating combined 1.8L_e/100km 1.8L_e x $1.95/ltr → **$3.51**

For annual 20,000km Tesla "fuel" costs **$406** For ICE at 8 lr/100km and $1.95/ltr costs **$3,120.**

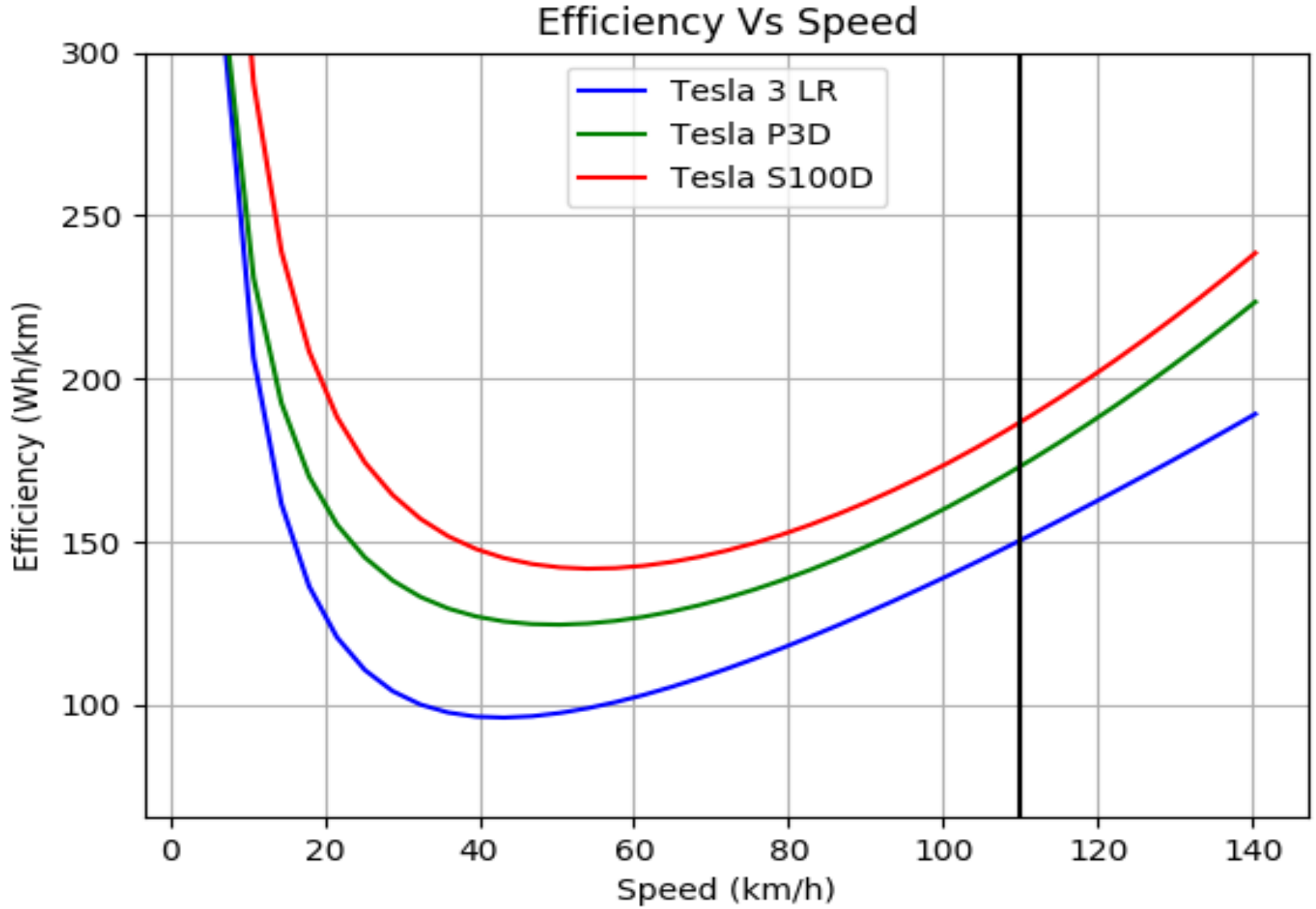
So for those who drive 20,000km/yr expect to save $2,714/yr

C2) Range(km) vs Speed (km/h)



https://forum.abetterrouteplanner.com/blogs/entry/22-tesla-model-3-performance-vs-rwd-consumption-real-driving-data-from-233-cars/

C3) Efficiency[Energy Consumption] (Wh/km) vs Speed (km/h)



https://forum.abetterrouteplanner.com/blogs/entry/22-tesla-model-3-performance-vs-rwd-consumption-real-driving-data-from-233-cars/

C4) Real-life Range Experience in Winter

You may wish to view the ~ 14 min Youtube video which compares the Tesla's **Standard** range, **Long** range, and **Performance** models for a ~0°C simultaneous winter road trip in Britain. Lots of data, but in summary the 3 models gave about the same energy consumption, range, and charging rates. https://youtu.be/xEuLK9GrnyA

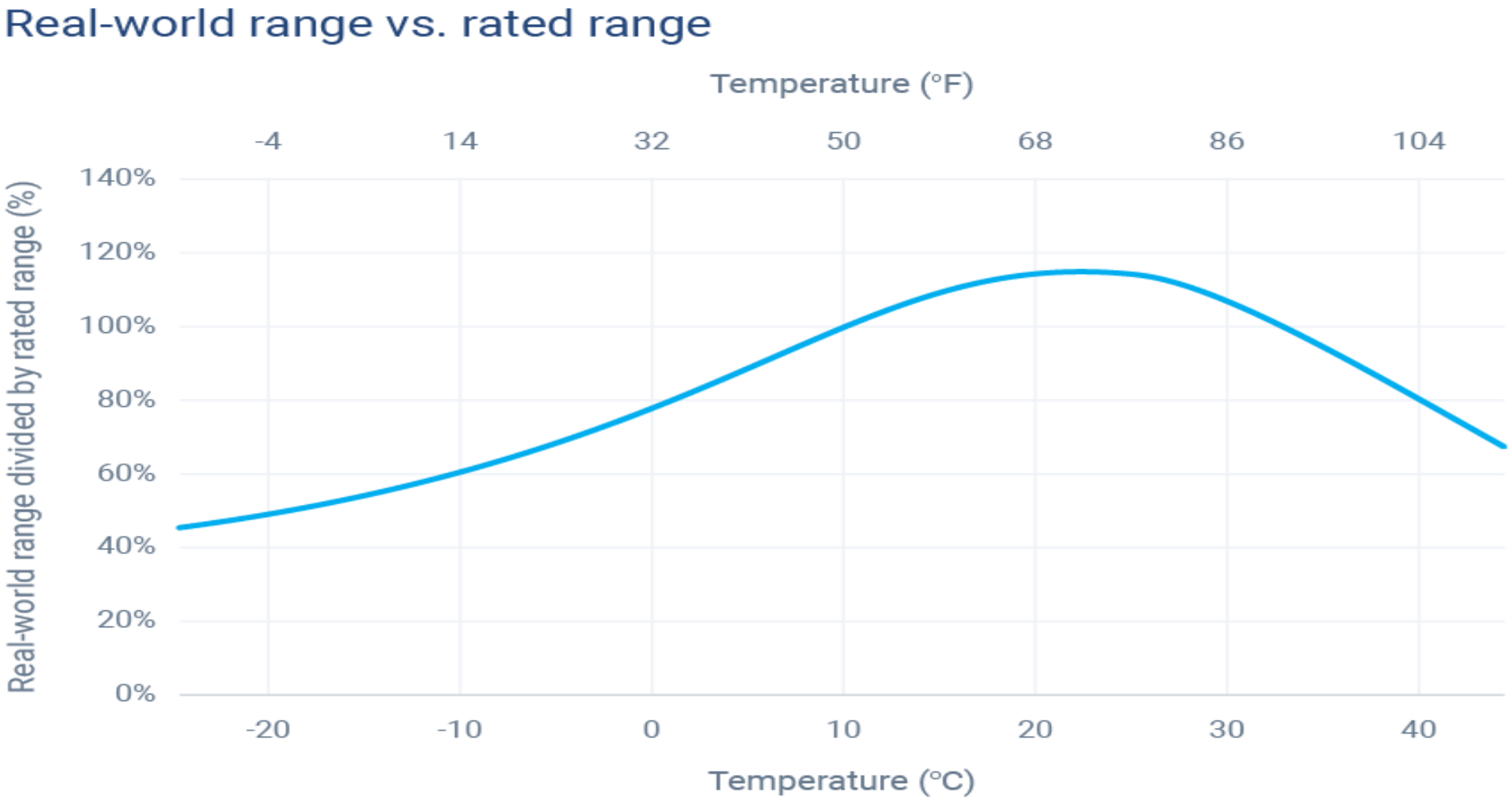
- Expect as little as 50% of published range when weather is ~ **-**20°C
- Use heated seats - since at low temperatures HVAC efficiency is low
- Dropping your speed will improve range.
  https://insideevs.com/news/490556/tesla-model-3-extreme-temperature-range-video/
  https://insideevs.com/features/464551/tesla-winter-cold-weather-driving-guide/

Note that ICE vehicles also loose range in colder weather

https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oee/pdf/transportation/fuel-efficient-technologies/autosmart_factsheet_3_e.pdf

C5) From https://www.geotab.com/blog/ev-range/

*"Most EVs follow the same **efficiency curve by temperature**, irrespective of their make, model or year... hot temperatures are worse for battery longevity than cold temperatures"*



D1) Driveability and Habit Adjustment

- After a couple of days you will find one-pedal driving very natural. Just don’t forget that in an emergency you should use the BRAKE pedal!
- Using **Autopilot** (as distinguished from Full Self-Driving which I do not recommend you get at this time) enables you to set speed and keep in your lane and slow down and speed up automatically is useful when traffic is not congested. Also **works well in stop-and-go traffic**. Must keep both hands on steering wheel. Lane changes are done manually and require resetting Autopilot if desired.
- The cabin is quite and has a superb audio system. Car a joy to drive.

E1) Driving in the Snow & Regenerative Braking Issues

Associated with winter driving is the question of **"How Long Can an EV Keep the Cabin Warm When It's Cold Out?"** From https://www.caranddriver.com/news/a38807463/tesla-model-3-climate-control-cold-weather-test/ I noted the following:

A 2019 Tesla Model 3 can keep its interior at 18C for almost two days max, losing an average of 2.2 percent of its charge per hour. The ambient outdoor temperature averaged -9C.

From https://cleantechnica.com/2022/01/09/how-long-can-a-tesla-keep-you-warm-in-a-frozen-traffic-jam-dirty-tesla-finds-out/ I noted the following:

A 2021 Tesla Model Y (with the new heat pump) kept its interior at 21C for 12 hours, losing 26.5kWh (2.2kWh/hour). The ambient outdoor temperature averaged about -10C.

In both studies the Tesla was set in "camp" mode.

It is more costly to keep warm in ICE vehicles for which one needs to care about carbon-monoxide issues.

E2) Regenerative Braking (RB) Issues

This technology allows for one-pedal driving, improves vehicle range, and reduces wear on the brakes. In fact I rarely use the brake. So under those circumstances brakes may well last the life of the car. Note that when RB is triggered the stop lights go on to warn drivers behind you. There are circumstances where this technology can hamper safety. REMARKS...

See also section H2(2)

H1) Overall User Experience

- Everything is much simpler except the one-pedal driving which needs a warning – learn to make sure you always know to use the brake pedal in most emergencies. Confusion can result in an accident.
- Driver seat/steering-wheel/mirrors can be customized for multiple drivers.
- To power off the car simply park it and walk away with your paired phone. The car locks – windows go fully closed – screen goes dark. If on console one has set Controls>locks>lock confirmation sound>ON then a soft horn beep will sound in ~ 20sec after exit to confirm.
- Notification on phone allows for immediate software updates. New features keep the vehicle technology up-to-date and extend life of the vehicle.
- One can make good use of vehicle despite not knowing all its capabilities/features!

- Tailgate opens too high to reach the close button? Just pull it down to position you like & long push button. Now it will open to that height.
- For those who find the acceleration a bit too much I suggest using the “chill mode” setting on the console. It remembers this.
- Teslas can be opened with a key card, a phone's Bluetooth, a phone’s nfc chip, a phone's app, your partner’s app (if your phone is lost, broken or has a dead battery) and by calling Tesla and answering some questions. Tesla key cards cost C$35 for a set of two in a card holder.
- **Do you ever save money on “fuel”** since a 100kWh battery is comparable to about 40ltrs of gasoline for ICE vehicles. But remember that 100kwh costs (@14c/kWh) **$14.00** while 40ltrs of gasoline (@1.95/ltr) today costs **$78.00**

H2) My Two Trips from North Vancouver to Kelowna and back

1.September 24th 2021

Left N.VAN for Kelowna (**~400km**) at 6am. Arrived at Klassen Rd Hope ~ 7:30am. Charged for 40minutes at SuperCharger – where I was the sole user! Breakfast.

Next jump was to Kelowna via Coquihalla HWY-5. Note that to raise 2000kg by 1244m takes ~6.8kWh[(a)]. Regeneration should capture ~ 64% back[(c)]. Other sources put regeneration at only about 17-30%[(b)].

(a) https://www.omnicalculator.com/physics/potential-energy (b) http://bpba.ca/projects/climate-action/electric-vehicles

(c) https://www.tesla.com/en_CA/blog/magic-tesla-roadster-regenerative-braking

2. 2021 Christmas Holidays – Dec 21/2021 – First day HWY 3 open

Left N.VAN 6am for Kelowna. Distance **460km**. Arrived at Klassen Rd Hope ~ 7:30am. Charged for ~ 40minutes at SuperCharger – where I was the again the sole user! Had breakfast.

This time took **HWY #3 Hope-Princeton which had just opened to non-essential travel.** Traffic was light and road in good shape. In fact it was our best ever trip – better than summertime! No trucks! Recharged in Princeton and arrived in Kelowna with no delays via #3 to Keremeos and #3a and #97. Charged using 40A/240V outlet at a private home.

Return trip on December 28th was a different story!!!

Roads were icy and covered with snow. Traffic heavy. Hard to see lane lines and potholes. Picked up a valuable lesson about impact of **Regenerative Braking** (which can **no longer be disabled** since the October 2020 software update) so driving through icy corners, despite having high quality winter tires instead of the standard all season tires, **created uncertainty for the driver as to how much braking is going on**. Used SuperChargers in Princeton and then Hope. Consumed at least 40% more kWhs than normal. Lots of vehicles in ditches in section Hope to Vancouver. **Still, enjoyed driving Tesla!**

3. Tesla Phantom Braking Issue Key Points

- NHTSA initiated a new safety-defects investigation into Tesla after a barrage of drivers' complaints to the agency of phantom-braking incidents.
- **Phantom braking refers to instances when a driver's brakes activate unexpectedly, and cause rapid deceleration of a car even if traffic is flowing normally or there is no obstacle to avoid.**
- The investigation concerns braking-related systems that are part of an estimated 416,000 Tesla Model 3 and Model Y vehicles from the 2021 and 2022 model years in the U.S. https://www.cnbc.com/2022/02/17/tesla-phantom-braking-complaints-elicit-nhtsa-investigation.html

Some personal experiences to be provided on this issue.

K1) Environmental Issues

Study by Reuters (https://www.reuters.com/business/autos-transportation/lifetime-carbon-emissions-electric-vehicles-vs-gasoline-cars-2021-06-29/)

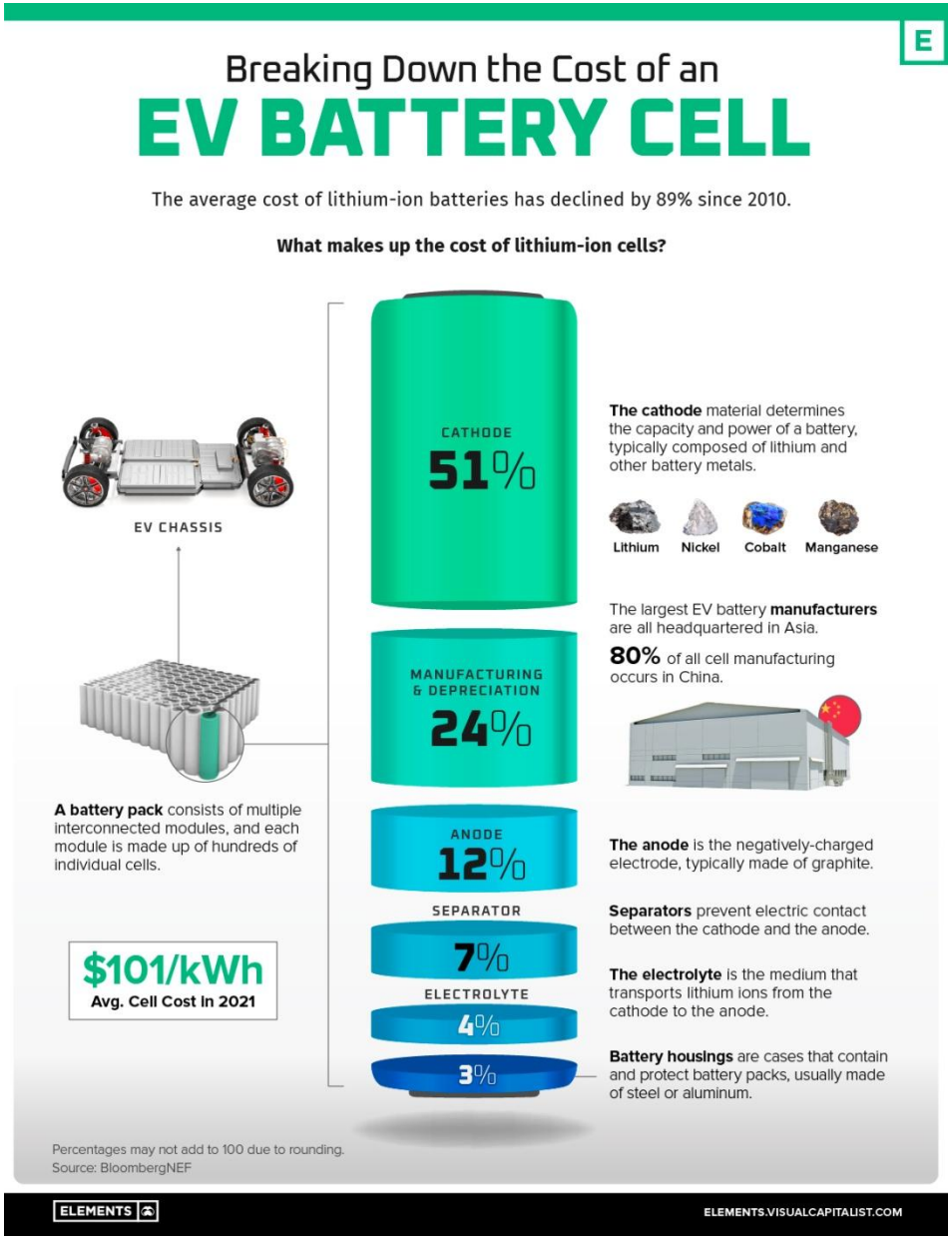
Tesla Model 3 (EV) vs Toyota Corolla (gasoline) the **"break-even" point** (where is does less harm to the environment), assuming Tesla 3 using electricity from BCHydro, **occurs at about 13,500 kilometres.**

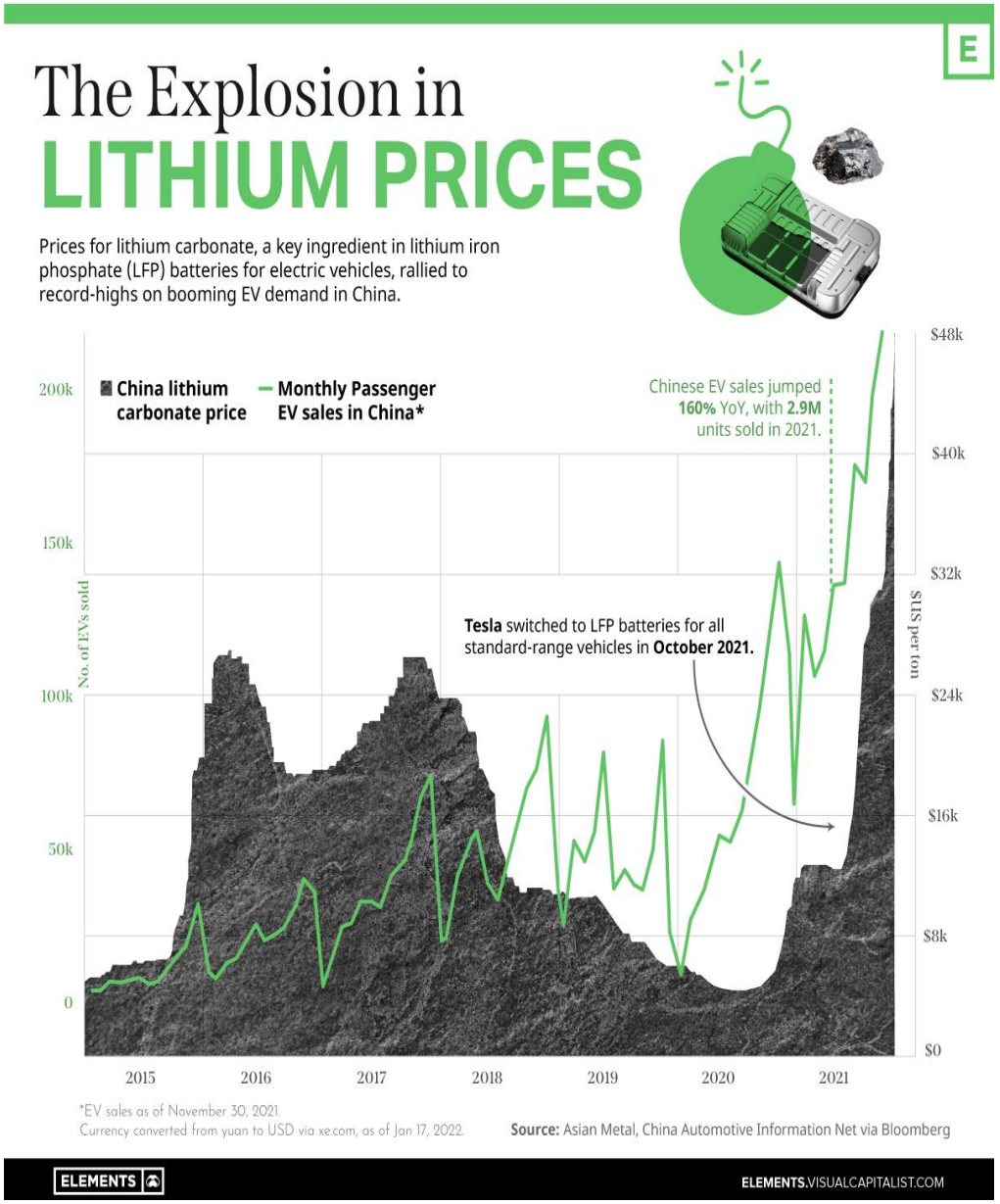
A somewhat dated (2017) report compared carbon emission of cyclists with EV's.

(https://www.greencarreports.com/news/1108357_electric-cars-vs-bicycles-which-has-a-higher-carbon-footprint)

"Exercise is good for virtually all humans for reasons that have nothing to do with lowering your personal carbon footprint. Ahem".

K2) Battery Component Costs and price of battery-grade lithium carbonate





This <u>may</u> explain the delay in EV deliveries!

K3) Battery Life

See also sections (A,J). After a lot of reading my conclusion – battery life is a non issue.

From https://www.findmyelectric.com/blog/how-long-does-a-tesla-battery-last/

Tesla's warranty includes a clause for retaining 70% battery capacity over the 8yr warranty period (typically between 160,000-190,000 km)

However from collected data (from Tesla models that have existed for many more years) one concludes that the Tesla 3 batteries should last 500,000 to 800,000km.

Tips for extending battery life: Avoid hot climates; Don't regularly charge past 85%; For longest battery life it is suggested to keep the charge between 20-80% (60-80% even better). Whenever possible, don't let the battery go above 90% or below 20%. Charge mainly at home since Superchargers put much more stress on the battery. Newer Tesla models using LFP batteries: Always charge to 100%

https://www.autocraftbodywerks.com/blog/maintaining-your-teslas-battery.html

K4) Maintenance Schedule

- Generally on an as-needed basis
- Schedule a service via “Schedule Service” on the mobile app
- Rotate tires every 10,000 km
- Change brake fluid every 2 years
- Change battery coolant every 4 years or 80,000 km.
- A/C desiccant bag replaced every 6 years
- Cabin air filter replaced every 2 years
- Perform daily and monthly checks according to manual.

K5) Near Future Battery Technology:

The video at https://www.youtube.com/watch?v=IIkA-mq5htw is worth a view. https://youtu.be/IIkA-mq5htw?t=727

Lithium Iron Phosphate (LFP) batteries.

Tesla has started shipping some models with LFP batteries in the 4680 format. The norm is to always charge these to 100%. LFP can readily be recharged ~ 1000 cycles with ~10% capacity loss. Note that driving range drops significantly below 10°C and would require thermal management. Note also that lower value of material makes recycling of LFP batteries less profitable (more of an environmental problem?).

https://www.greencarreports.com/news/1134547_2022-tesla-model-3-charging-to-100-can-be-the-norm-for-272-mile-lfp-version

BYD Blade Cells -with Lithium Iron Phosphate (LFP) cells -LiFePO4 **)**

Due to their geometric configuration they are much safer. Energy densities of 176Wh/kg have been reported.

https://www.youtube.com/watch?v=uEvR3kyx_KM https://pushevs.com/2021/09/30/new-energy-density-record-for-a-lfp-battery/
https://www.allaboutcircuits.com/news/a-closer-look-at-lithium-iron-phosphate-batteries-teslas-new-choice-of-battery/
https://en.wikipedia.org/wiki/Lithium_iron_phosphate_battery

L1) Insurance and repairing an EV

My ICBC: pleasure driving only, $5million Third party liability, $500 deductable for collision and comprehensive + Roadstar plus and misc minor items total annual cost was **$1,628.** Supplementary coverage to reduce $500 to zero with new vehicle replacement for a 5 yr period totalled **$2,332** ($467/yr). All done at place where I picked up the Tesla at 901 Great Northern Way, Vancouver.
It is worth watching the youtube video https://youtu.be/cxPRNDgQdwM since it was not about a minor accident, and took about 2 months to get the author's Tesla back to a new state.

Now for my own experience of having an accident...

Cause: Mistakenly using the accelerator pedal instead of the brake when parking. Car was still driveable after accident.

Automatic Emergency Braking **does <u>not</u> apply the brakes, or stops applying the brakes, when:**

- *You turn the steering wheel sharply.*
- *You press and release the brake pedal while Automatic Emergency Braking is applying the brakes.*
- ***You accelerate hard while Automatic Emergency Braking is applying the brakes.***
- *The vehicle, motorcycle, bicycle, or pedestrian is no longer detected ahead.*

Automatic Emergency Braking is always enabled when you start Model 3. To disable it for your current drive, touch Controls > Autopilot > Automatic Emergency Braking.

Phoned ICBC Claim Office 604-520-8222 (needs drivers license and license plate number) – and after a short description of accident was provided with a claim #.

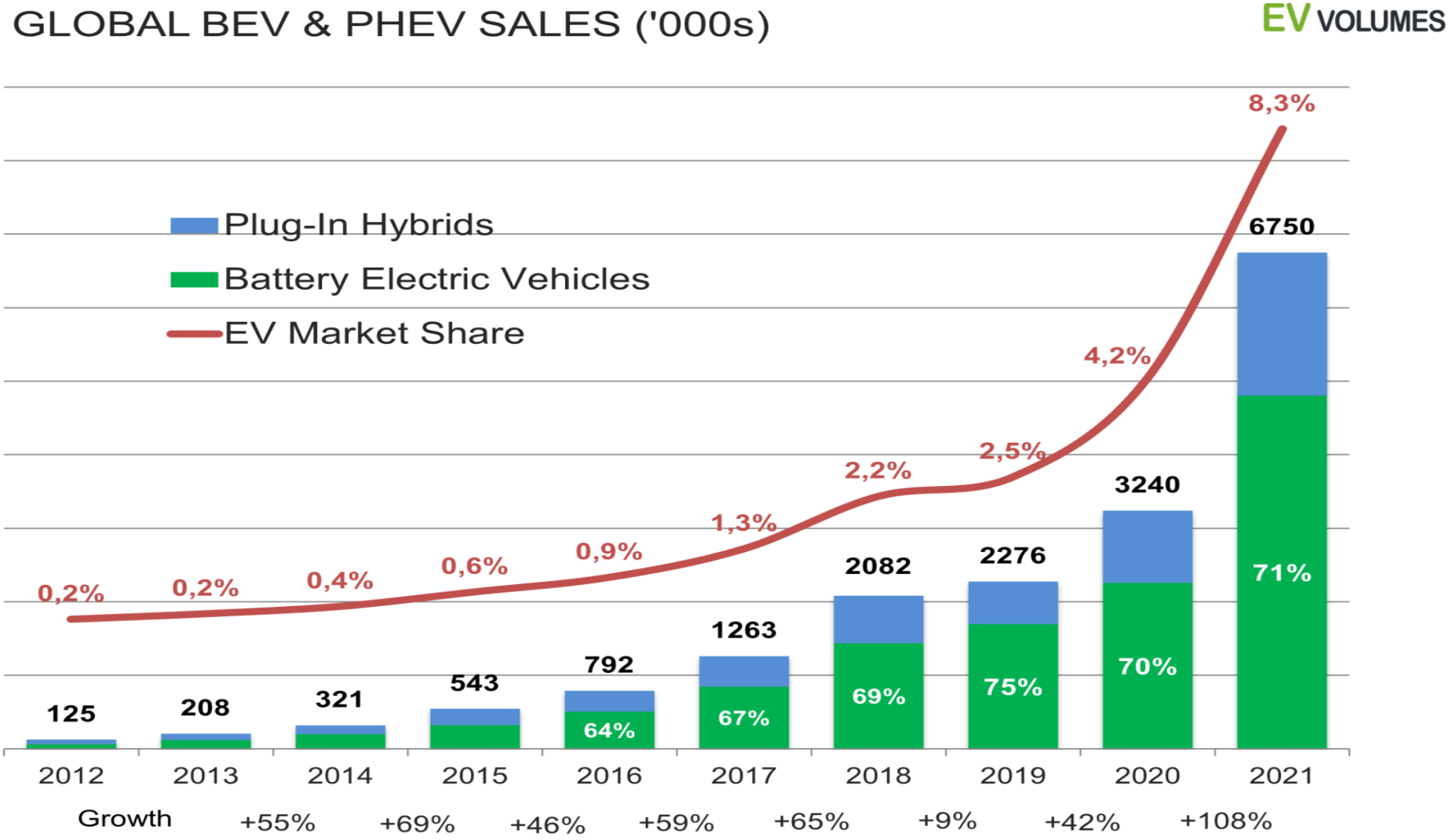
Insurance covered all costs and deductable ($500) since I had taken out an **extra** policy from a private insurance company to cover deductable etc.

Repair Time: Accident, which occurred in a parking lot on Feb 11. Cost of repair was estimated on Feb 17. Damage: ~$7500 to my Tesla 3 LR. Parts to be ordered – should take about 2-3 weeks. I expect to have car fully repaired by mid March.

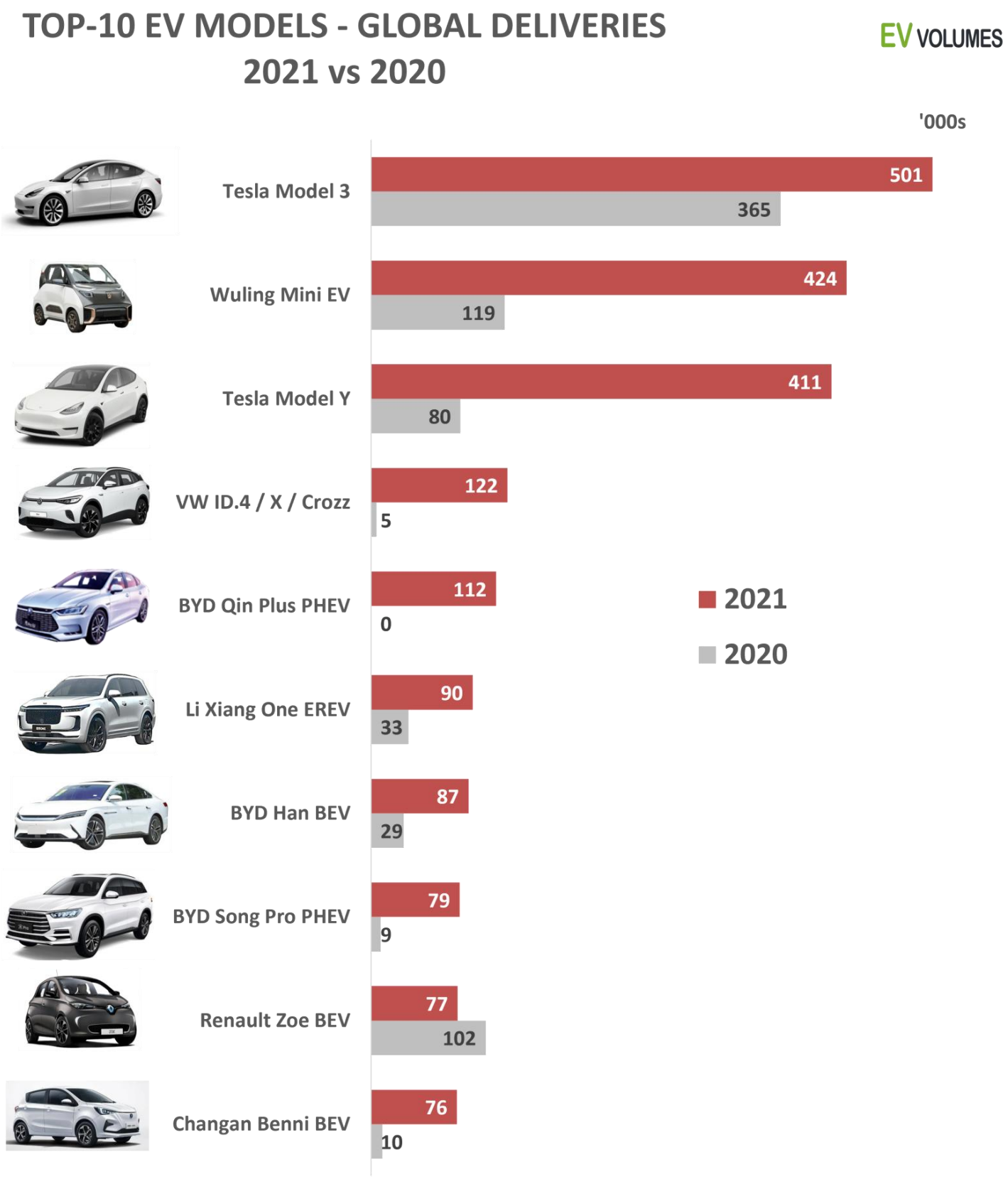
Global EV Volumes

https://www.ev-volumes.com/

For detailed definitions of various terms relating to electric vehicles, such as BEV, EREV, PHEV, HEV, FCEV, ZEV, ICE etc. see http://curenev.com



2021 and 2020 Sales of Top-10 EV models



FACTOIDS ABOUT EV's

- US has about 130,000 fuel STATIONS and about 110,000 electric chargers[(fs)]
- US has 2-million EV's on roads (16,000 10 years ago)[(fs)]
- Projecting 30-million EV's in US by 2030 with 500,000 chargers[(fs)]
- Currently - Globally EV's are only 1 in 250 and 1 in 50 market share of cars
- Ideal to have 40 Level 2 and 3.4 DC fast chargers (DCFC) per 1000 EV's[(fs)]
- Currently there are 41 Level 2 and 5.7 DCFC chargers per 1000 EV's[(fs)]
- Average range of EV-259 miles (416km) , for ICE-360 miles (579km)[(fs)]
- My 2021 Tesla 3 LR is rated for 568km & annual cost $406 (20,000km) [(fe)]
- **EV's transfer ~80% of energy to wheels, while ICE about 25%**
- Drag coefficient -resistance to the air of front surface of a Tesla Model 3 is 0.23
- Majority of car drivers travel less than 40km per day.
- By Aug 2021 there were 5.6 million EV's in the world
- Batteries now make up ~ 40% of the cost of an EV and ~ 20% by 2030[(fb)]
- EV sales make up 58% of new cars in Norway.[(fn)]
- Compound Annual Growth Rate (CAGR) for EV's is predicted as 38% by 2024[(fg)]

(fb) https://www.statista.com/statistics/797638/battery-share-of-large-electric-vehicle-cost/

(fe) http://vehicles.rncan.gc.ca

(fg) https://www.globenewswire.com/news-release/2020/11/11/2124610/0/en/The-global-electric-vehicle-market-is-expected-to-reach-an-estimated-335-3-billion-by-2023-with-a-CAGR-of-38-from-2018-to-2023.html

(fn) https://www.reuters.com/business/autos-transportation/electric-cars-take-two-thirds-norway-car-market-led-by-tesla-2022-01-03/

(fs) https://insideevs.com/news/567694/chargers-outnumber-gas-stations-soon/

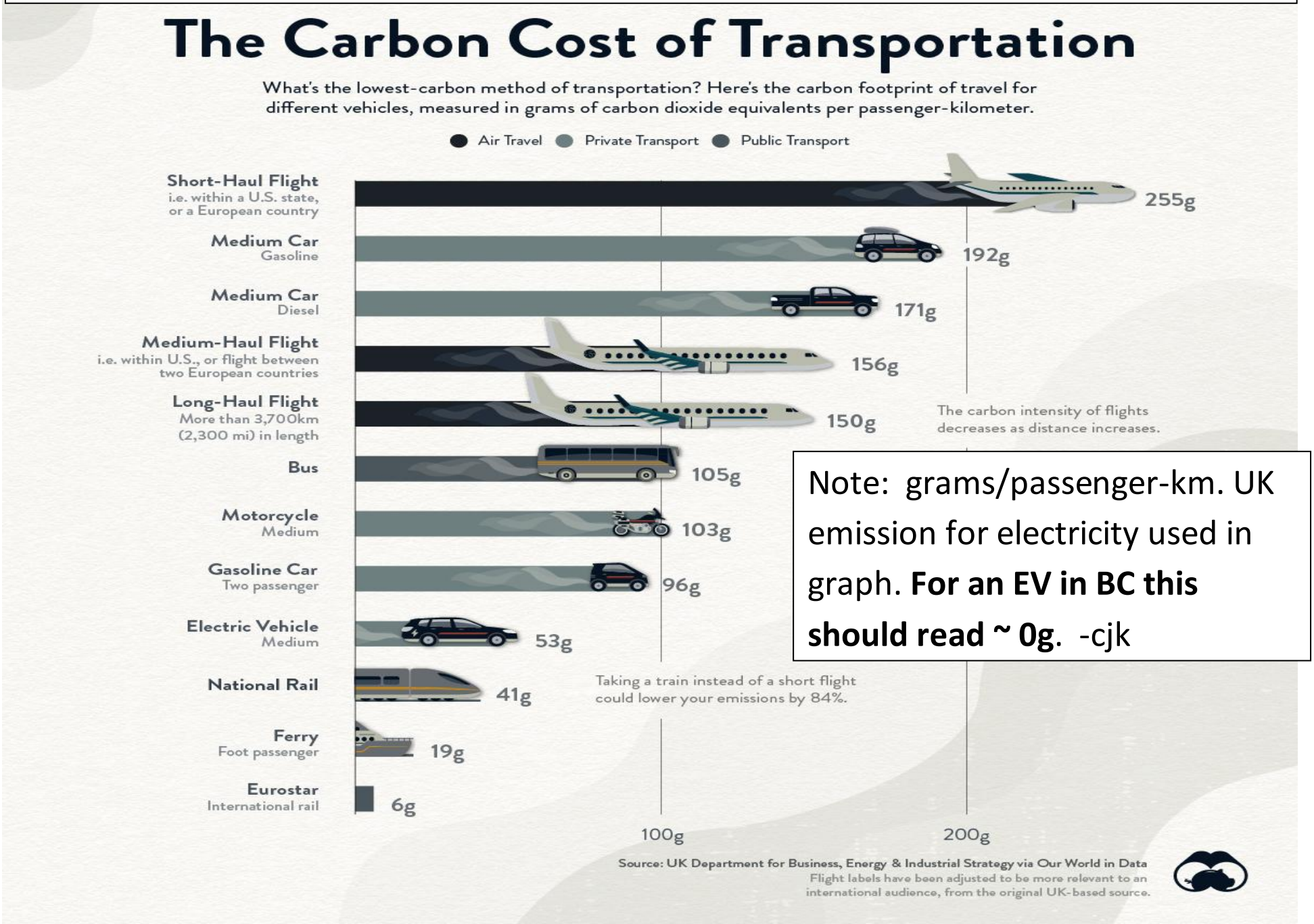
Tips on Tesla Delivery Dates

1. Complete all steps in your Tesla account and order to move things along. If you have unfinished paperwork or incomplete steps in your order, then Tesla won't move forward to confirming a VIN and then a delivery date. So, make sure you check your account regularly and are sure you've completed all necessary paperwork and other steps when you need to.

2. Keep in regular contact with your customer service representative. It's the representative who will be contacting you to arrange a delivery date and time. It's imperative that you are always reachable by that person and that you remain in regular contact in order to keep things moving smoothly, and to ensure that your delivery date can be confirmed. If they can't reach you about a particular time or date, they might postpone your delivery further.

3. Don't get frustrated when deadlines come and go. Any dates that you get from Tesla are invariably just estimates and should always be taken with a pinch of salt. The waiting game requires patience and a level head. Just know that it's not just you, and never feel like everyone is getting their Tesla but you. Numerous factors go into the precise delivery time and everyone just has to play the waiting game.

N1)https://www.visualcapitalist.com/comparing-the-carbon-footprint-of-transportation-options/

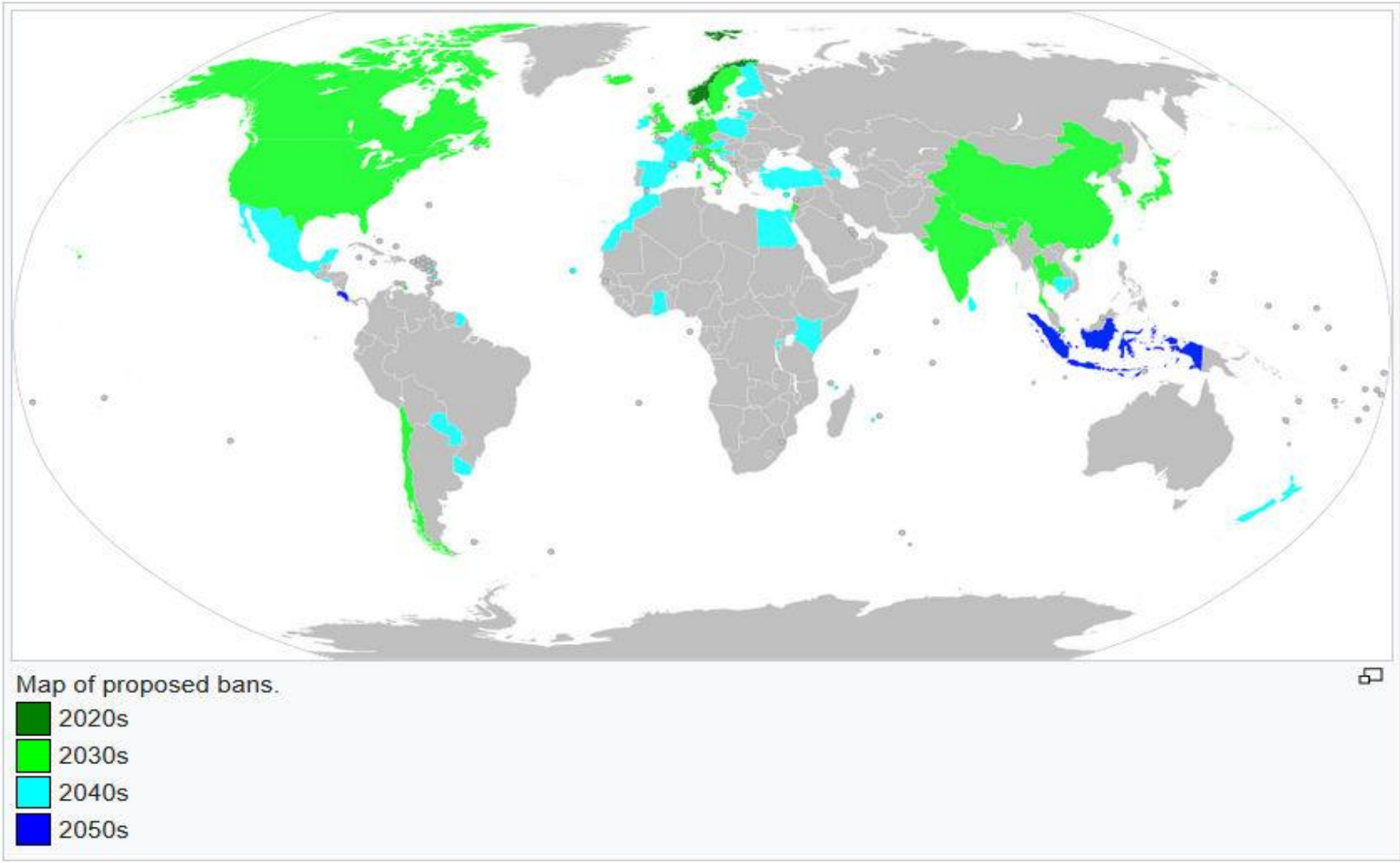


Note: grams/passenger-km. UK emission for electricity used in graph. **For an EV in BC this should read ~ 0g**. -cjk

N2) Global Legislation to Phase out ICE vehicles

New phase-out dates for ICE passenger cars and vans, moving from the initial 2040 target to specified goals for 2035 and 2030[(a)].

Countries with proposed bans or implementing 100% sales of zero-emissions vehicles include China (including Hong Kong and Macau), Japan, Singapore, the UK, South Korea, Iceland, Denmark, Sweden, Norway, Slovenia, Germany, Italy, France, Belgium, the Netherlands, Portugal, Canada, the 12 U.S. states that adhered to California's Zero-Emission Vehicle (ZEV) Program, Sri Lanka, Cabo Verde, and Costa Rica[(b)]



Map of proposed bans.

- 2020s
- 2030s
- 2040s
- 2050s

(a)https://theicct.org/sites/default/files/publications/update-govt-targets-ice-phaseouts-jun2021_0.pdf

(b) https://en.wikipedia.org/wiki/Phase-out_of_fossil_fuel_vehicles

https://cdn.motor1.com/images/custom/bev-car-comparisons-us-2022-02-07-img.png

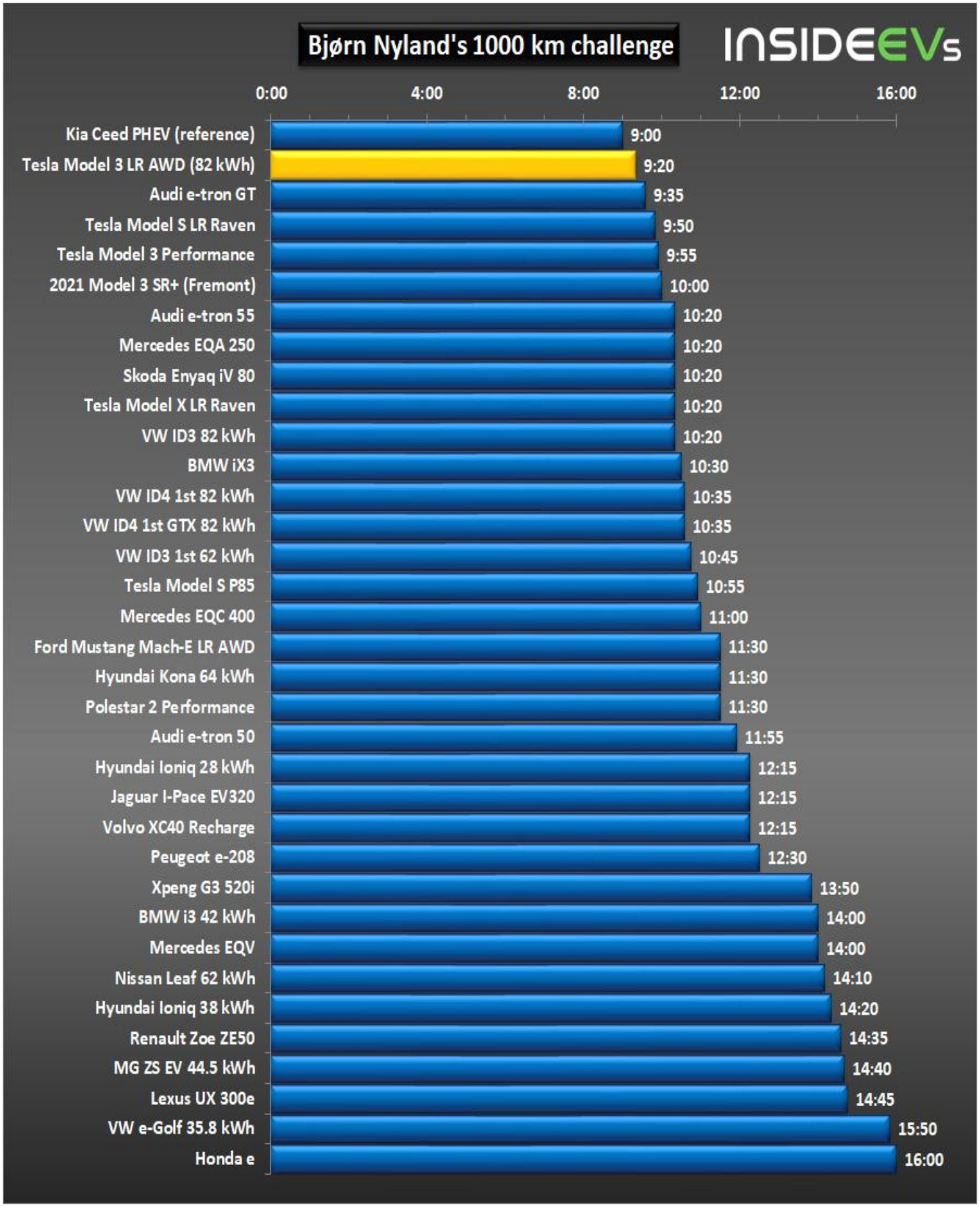
INSIDEEVs

All-Electric Car Comparisons - US

Updated 2022-02-07

Estimated/Unofficial

Brand	Model		Base Price (MSRP)	Dest. Charge	Tax Credit	Price After Tax Credit	Battery Size (kWh)	EPA Range (mi)	0-60 mph (sec)	Top Speed (mph)	Peak Power (kW)	EPA Energy Consumption combined / city / highway (Wh/mi)		
Audi	e-tron GT quattro 20" (2022)	AWD	$102 400	$1 045	$7 500	$ 95 945	93.4	238	3.9	152	390	411	416	406
Audi	RS e-tron GT quattro 20" (2022)	AWD	$142 400	$1 045	$7 500	$ 135 945	93.4	232	3.1	155	475	416	427	411
Audi	e-tron quattro 20" (2022)	AWD	$ 65 900	$1 095	$7 500	$ 59 495	95	222	5.5	124	300	432	432	438
Audi	e-tron Sportback quattro 20" (2022)	AWD	$ 69 100	$1 095	$7 500	$ 62 695	95	218	5.5	124	300	438	443	432
Audi	e-tron S 20" (2022)	AWD	$ 84 800	$1 095	$7 500	$ 78 395	95	208	4.3	130	370	462	468	449
Audi	e-tron S 21" (2022)	AWD	$ 87 450	$1 095	$7 500	$ 81 045	95	181	4.3	130	370	535	544	527
Audi	e-tron S Sportback 20" (2022)	AWD	$ 87 400	$1 095	$7 500	$ 80 995	95	212	4.3	130	370	449	462	432
Audi	e-tron S Sportback 21" (2022)	AWD	$ 90 050	$1 095	$7 500	$ 83 645	95	185	4.3	130	370	518	527	511
Audi	Q4 40 e-tron 19" (2022)	RWD	$ 43 900	$1 095	$7 500	$ 37 495	82	250	7.9	99	150			
Audi	Q4 50 e-tron quattro 19" (2022)	AWD	$ 49 900	$1 095	$7 500	$ 43 495	82	241	5.8	112	220	355	337	379
Audi	Q4 Sportback 50 e-tron quattro 20" (2022)	AWD	$ 52 700	$1 095	$7 500	$ 46 295	82	241	5.8	112	220	355	337	379
BMW	i4 eDrive40 18" (2022)	RWD	$ 55 400	$ 995	$7 500	$ 48 895	83.9	301	5.5	118	250			
BMW	i4 M50 19" (2022)	AWD	$ 65 900	$ 995	$7 500	$ 59 395	83.9	270	3.7	130	400			
BMW	iX xDrive50 20" (2022)	AWD	$ 83 200	$ 995	$7 500	$ 76 695	111.5	324	4.4	124	385			
Cadillac	Lyriq Debut Edition (2023)	RWD	$ 58 795	$1 195	N/A	$ 59 990	100.4	300			255			
Chevrolet	Bolt EV (2022)	FWD	$ 31 000	$ 995	N/A	$ 31 995	65	259	6.5		150	281	257	309
Chevrolet	Bolt EUV (2022)	FWD	$ 33 000	$ 995	N/A	$ 33 995	65	247	7.0		150	293	270	324
Ford	F-150 Pro SR 18" (2022)	AWD	$ 39 974	$1 695	$7 500	$ 34 169	110	230			318			
Ford	F-150 Pro ER (fleets) 18" (2022)	AWD	$ 49 974	$1 695	$7 500	$ 44 169	145	300			420			
Ford	F-150 Lightning XLT SR 18" (2022)	AWD	$ 52 974	$1 695	$7 500	$ 47 169	110	230			318			
Ford	F-150 Lightning XLT ER 20" (2022)	AWD	$ 72 474	$1 695	$7 500	$ 66 669	145	300			420			
Ford	F-150 Lightning Lariat SR 20" (2022)	AWD	$ 67 474	$1 695	$7 500	$ 61 669	110	230			318			
Ford	F-150 Lightning Lariat ER 20" (2022)	AWD	$ 77 474	$1 695	$7 500	$ 71 669	145	300			420			
Ford	F-150 Lightning Platinum ER 22" (2022)	AWD	$ 90 874	$1 695	$7 500	$ 85 069	145	280			420			
Ford	Mustang Mach-E Select SR RWD 18" (2022)	RWD	$ 43 895	$1 100	$7 500	$ 37 495	75.7	247	5.8		198			
Ford	Mustang Mach-E Select SR AWD 18" (2022)	AWD	$ 46 595	$1 100	$7 500	$ 40 195	75.7	224	5.2		198			
Ford	Mustang Mach-E Premium SR RWD 19" (2022)	RWD	$ 49 100	$1 100	$7 500	$ 42 700	75.7	247	5.8		198			
Ford	Mustang Mach-E Premium SR AWD 19" (2022)	AWD	$ 51 800	$1 100	$7 500	$ 45 400	75.7	224	5.2		198			
Ford	Mustang Mach-E Premium ER RWD 19" (2022)	RWD	$ 55 100	$1 100	$7 500	$ 48 700	98.8	303	6.1		216			
Ford	Mustang Mach-E Premium ER AWD 19" (2022)	AWD	$ 57 800	$1 100	$7 500	$ 51 400	98.8	277	4.8		258			
Ford	Mustang Mach-E Route 1 ER RWD 18" (2022)	RWD	$ 52 775	$1 100	$7 500	$ 46 375	98.8	314	6.1		216			
Ford	Mustang Mach-E Route 1 ER AWD 18" (2022)	AWD	$ 55 475	$1 100	$7 500	$ 49 075	98.8	312	4.8		258			
Ford	Mustang Mach-E GT ER AWD 20" (2022)	AWD	$ 61 995	$1 100	$7 500	$ 55 595	98.8	270	3.8		358	401	374	438
Ford	Mustang Mach-E GT Perf. ER AWD 20" (2022)	AWD	$ 67 995	$1 100	$7 500	$ 61 595	98.8	260	3.5		358	411	383	449
GMC	Hummer EV Pickup (Edition 1) (2022)	AWD	$110 295		N/A	$ 110 295	200	329	3.0		745			
Hyundai	Ioniq 5 SE SR RWD 19" (2022)	RWD	$ 39 700	$1 225	$7 500	$ 33 425	58.2	220			125	306	265	359
Hyundai	Ioniq 5 SE RWD 19" (2022)	RWD	$ 43 650	$1 225	$7 500	$ 37 375	77.4	303		115	168	296	255	344
Hyundai	Ioniq 5 SE AWD 19" (2022)	AWD	$ 47 150	$1 225	$7 500	$ 40 875	77.4	256	5.0	115	239	344	306	387
Hyundai	Ioniq 5 SEL RWD 19" (2022)	RWD	$ 45 900	$1 225	$7 500	$ 39 625	77.4	303		115	168	296	255	344
Hyundai	Ioniq 5 SEL AWD 19" (2022)	AWD	$ 49 400	$1 225	$7 500	$ 43 125	77.4	256	5.0	115	239	344	306	387
Hyundai	Ioniq 5 Limited RWD 19" (2022)	RWD	$ 50 600	$1 225	$7 500	$ 44 325	77.4	303		115	168	296	255	344
Hyundai	Ioniq 5 Limited AWD 20" (2022)	AWD	$ 54 500	$1 225	$7 500	$ 48 225	77.4	256	5.0	115	239	344	306	387
Hyundai	IONIQ Electric (2021)	FWD	$ 33 245	$1 005	$7 500	$ 26 750	38.3	170	10.0	102	100	253	232	279
Hyundai	Kona Electric (2022)	FWD	$ 34 000	$1 185	$7 500	$ 27 685	64	258	7.9	104	150	281	255	312
Jaguar	I-PACE EV400 (2022)	AWD	$ 69 900	$1 150	$7 500	$ 63 550	90	234	4.5	124	294	443	421	468
Kia	EV6 Light RWD SR 19" (2022)	RWD	$ 40 900	$1 215	$7 500	$ 34 615	58	232	8.0	115	125	288	248	337
Kia	EV6 Wind RWD LR 19" (2022)	RWD	$ 47 000	$1 215	$7 500	$ 40 715	77.4	310	7.2	115	168	288	251	334
Kia	EV6 Wind AWD LR 19" (2022)	AWD	$ 50 900	$1 215	$7 500	$ 44 615	77.4	274	5.1	117	239	321	291	359
Kia	EV6 GT-Line RWD LR 19" (2022)	RWD	$ 51 200	$1 215	$7 500	$ 44 915	77.4	310	7.2	115	168	288	251	334
Kia	EV6 GT-Line AWD LR 19" (2022)	AWD	$ 55 900	$1 215	$7 500	$ 49 615	77.4	274	5.1	117	239	321	291	359
Kia	EV6 First Edition AWD LR 20" (2022)	AWD	$ 58 500	$1 215	$7 500	$ 52 215	77.4	265	5.1	117	239			
Kia	Niro EV (2022)	FWD	$ 39 990	$1 175	$7 500	$ 33 665	64	239	7.5	104	150	301	274	330
Lucid	Air Dream Edition Performance 19" (2022)	AWD	$169 000	$1 500	$7 500	$ 163 000	118	471	2.5	168	828	291	288	296
Lucid	Air Dream Edition Performance 21" (2022)	AWD	$169 000	$1 500	$7 500	$ 163 000	118	451	2.4	168	828	304	306	304
Lucid	Air Dream Edition Range 19" (2022)	AWD	$169 000	$1 500	$7 500	$ 163 000	118	520	2.7	168	695	270	267	270
Lucid	Air Dream Edition Range 21" (2022)	AWD	$169 000	$1 500	$7 500	$ 163 000	118	481	2.7	168	695	291	293	288
Lucid	Air Grand Touring 19" (2022)	AWD	$139 000	$1 500	$7 500	$ 133 000	112	516	3.0	168	596	257	259	255
Lucid	Air Grand Touring 21" (2022)	AWD	$139 000	$1 500	$7 500	$ 133 000	112	469	3.0	168	596	279	279	276
Mazda	MX-30 (2022)	FWD	$ 33 470	$1 175	$7 500	$ 27 145	35.5	100		87	107	366	344	396
Mercedes	EQS 450+ (RWD; 20") (2022)	RWD	$102 310	$1 050	$7 500	$ 95 860	115	350	5.9	130	245	347	347	347
Mercedes	EQS 580 4MATIC (AWD; 21") (2022)	AWD	$119 110	$1 050	$7 500	$ 112 660	115	340	4.1	130	385	355	366	340
MINI	Cooper SE (2022)	FWD	$ 29 900	$ 850	$7 500	$ 23 250	32.6	114	6.9	93	135	306	283	337
Nissan	Ariya Venture+ FWD 19" (2023)	FWD	$ 45 950	$1 175	$7 500	$ 39 625	91	300	7.2		178			
Nissan	Ariya Evolve+ FWD 19" (2023)	FWD	$ 48 950	$1 175	$7 500	$ 42 625	91	285	7.2		178			
Nissan	Ariya Premiere FWD 19" (limited) (2023)	FWD	$ 53 450	$1 175	$7 500	$ 47 125	91	285	7.2		178			
Nissan	Ariya Platinum+ e-4ORCE AWD 19" (2023)	AWD	$ 58 950	$1 175	$7 500	$ 52 625	91	265	4.8		290			
Nissan	LEAF S (40 kWh) (2022)	FWD	$ 27 400	$ 975	$7 500	$ 20 875	40	149	7.4	90	110	304	274	340
Nissan	LEAF e+ S (62 kWh) (2022)	FWD	$ 32 400	$ 975	$7 500	$ 25 875	62	226	6.5		160	312	286	347
Nissan	LEAF e+ SV (62 kWh) (2022)	FWD	$ 37 400	$ 975	$7 500	$ 30 875	62	215	6.5		160	324	296	359
Polestar	2 Single Motor 19" (2022)	FWD	$ 45 900	$1 300	$7 500	$ 39 700	78	270	7.0	100	170	315	298	337
Polestar	2 Dual Motor 19" (2022)	AWD	$ 49 900	$1 300	$7 500	$ 43 700	78	249	4.5	127	300	379	359	401
Porsche	Taycan (79 kWh) 19" (2022)	RWD	$ 82 700	$1 350	$7 500	$ 76 550	79.2	200	5.1	143	300	427	443	401
Porsche	Taycan (93 kWh) 19" (2022)	RWD	$ 88 480	$1 350	$7 500	$ 82 330	93.4	225	5.1	143	350	449	475	421
Porsche	Taycan 4S (79 kWh) 19" (2022)	AWD	$103 800	$1 350	$7 500	$ 97 650	79.2	199	3.8	155	390	427	427	421
Porsche	Taycan 4S (93 kWh) 19" (2022)	AWD	$109 370	$1 350	$7 500	$ 103 220	93.4	227	3.8	155	420	438	449	416
Porsche	Taycan GTS (93 kWh) 20" (2022)	AWD	$131 400	$1 350	$7 500	$ 125 250	93.4		3.5	155	440			
Porsche	Taycan Turbo (93 kWh) 20" (2022)	AWD	$150 900	$1 350	$7 500	$ 144 750	93.4	212	3.0	161	500	462	475	449
Porsche	Taycan Turbo S (93 kWh) 21" (2022)	AWD	$185 000	$1 350	$7 500	$ 178 850	93.4	201	2.6	161	560	481	488	475
Porsche	Taycan 4 Cross Turismo 19" (2022)	AWD	$ 93 700	$1 350	$7 500	$ 87 550	93.4	215	4.8	137	350	443	443	438
Porsche	Taycan 4S Cross Turismo 19" (2022)	AWD	$110 300	$1 350	$7 500	$ 104 150	93.4	215	3.9	149	420	449	449	449
Porsche	Taycan GTS Sport Turismo 20" (2022)	AWD	$133 300	$1 350	$7 500	$ 127 150	93.4		3.5	155	440			
Porsche	Taycan Turbo Cross Turismo 20" (2022)	AWD	$153 500	$1 350	$7 500	$ 147 350	93.4	204	3.1	155	500	468	468	468
Porsche	Taycan Turbo S Cross Turismo 20" (2022)	AWD	$187 600	$1 350	$7 500	$ 181 450	93.4	202	2.7	155	560	462	455	462
Rivian	R1S (Large pack, 21") (2022)	AWD	$ 70 000	$1 075	$7 500	$ 63 575	135	316	3.0	125	562	488	462	518
Rivian	R1T (Large pack, 21") (2022)	AWD	$ 67 500	$1 075	$7 500	$ 61 075	135	314	3.0	125	562	481	455	511
Tesla	Model 3 RWD 18" (2022)	RWD	$ 44 990	$1 200	N/A	$ 46 190	60	272	5.8	140		255	244	267
Tesla	Model 3 RWD 19" (2022)	RWD	$ 46 490	$1 200	N/A	$ 47 690	60	267	5.8	140				
Tesla	Model 3 Long Range AWD 18" (2022)	AWD	$ 50 990	$1 200	N/A	$ 52 190	80	358	4.2	145		257	251	267
Tesla	Model 3 Long Range AWD 19" (2022)	AWD	$ 52 490	$1 200	N/A	$ 53 690	80	334	4.2	145				
Tesla	Model 3 Perf. LR AWD 20" (2022)	AWD	$ 58 990	$1 200	N/A	$ 60 190	80	315	3.1	162		298	286	315
Tesla	Model S LR AWD 19" (2022)	AWD	$ 94 990	$1 200	N/A	$ 96 190	100	405	3.1	155	499	281	272	293
Tesla	Model S LR AWD 21" (2022)	AWD	$ 99 490	$1 200	N/A	$ 100 690	100	375	3.1	155	499			
Tesla	Model S Plaid 19" (2022)	AWD	$129 990	$1 200	N/A	$ 131 190	100	396	2.0	200	760	291	283	301
Tesla	Model S Plaid 21" (2022)	AWD	$134 490	$1 200	N/A	$ 135 690	100	348	2.0	200	760	334	330	340
Tesla	Model X LR AWD 20" (2022)	AWD	$104 990	$1 200	N/A	$ 106 190	100	348	3.8	155	499	330	315	347
Tesla	Model X LR AWD 22" (2022)	AWD	$110 490	$1 200	N/A	$ 111 690	100	332	3.8	155	499			
Tesla	Model X Plaid 20" (2022)	AWD	$126 490	$1 200	N/A	$ 127 690	100	333	2.5	163	760	344	327	362
Tesla	Model X Plaid 22" (2022)	AWD	$131 990	$1 200	N/A	$ 133 190	100	311	2.5	163	760	370	359	383
Tesla	Model Y Long Range AWD 19" (2022)	AWD	$ 58 990	$1 200	N/A	$ 60 190	80	330	4.8	135		276	265	288
Tesla	Model Y Long Range AWD 20" (2022)	AWD	$ 60 990	$1 200	N/A	$ 62 190	80	318	4.8	135				
Tesla	Model Y Perf. LR AWD 21" (2022)	AWD	$ 63 990	$1 200	N/A	$ 65 190	80	303	3.5	155		304	293	318
Volvo	C40 Recharge (2022)	AWD	$ 58 750	$1 095	$7 500	$ 52 345	78	226	4.7	112	300	387	359	421
Volvo	XC40 Recharge (2022)	AWD	$ 55 300	$1 095	$7 500	$ 48 895	78	223	4.7	112	300	396	366	427
Volkswagen	ID.4 Pro 19" (2022)	RWD	$ 40 760	$1 195	$7 500	$ 34 455	82	260	7.7	99	150			
Volkswagen	ID.4 Pro S 19" (2022)	RWD	$ 45 260	$1 195	$7 500	$ 38 955	82	250	7.8	99	150			
Volkswagen	ID.4 AWD Pro 19" (2022)	AWD	$ 44 440	$1 195	$7 500	$ 38 135	82	249	5.7	111	220			
Volkswagen	ID.4 AWD Pro S 19" (2022)	AWD	$ 48 940	$1 195	$7 500	$ 42 635	82	240	5.8	111	220			



From : https://insideevs.com/news/521066/tesla-model3-lr-record-1000km/amp/

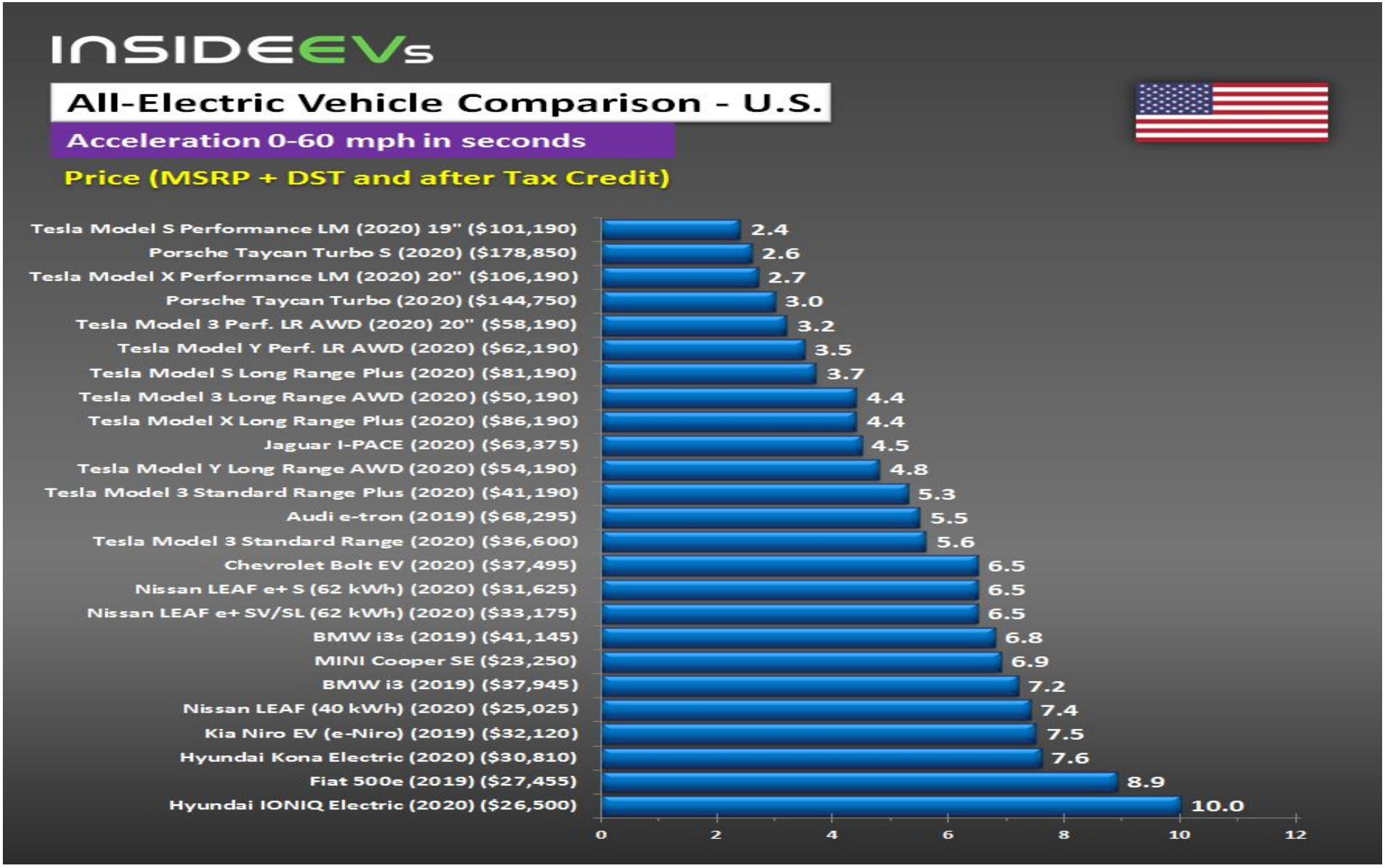
Date: July 11, 2021, Sunday (but traffic was surprisingly high)

- **Temperatures:** 17-22°C (20°C on average)
- **Start:** 100% State of Charge (SOC)
- **Number of stops for charging:** 4 (usually until charging power will fall to 120 kW or less)
- **Total time:** 9 hours and 20 minutes
- **Average speed (total):** 111 km/h (69 mph)
- **Average efficiency:** 186 Wh/km (299 Wh/mile)

Charging stops:

1. Charging: after 400 km (249 miles) at a Tesla Supercharger (V3)
2. Charging: after 569 km (354 miles) at a non-Tesla charger (IONITY)
3. Charging: after 735 km (457 miles) at a non-Tesla charger
4. Charging: after 868 km (539 miles) at a non-Tesla charger (IONITY)

All-Electric Car Acceleration Compared - March 14, 2020



https://insideevs.com/reviews/409518/electric-car-acceleration-compared-us-april-2020/