Electric Cars

For potential buyers

May 6, 2024

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v6.0

Common Questions

People Ask

About my car

- Do you like it?
  - Yes, very much. I haven’t been to a gas station to fill-up in five years.
- What range do you get?
  - About 400 km in summer; 300 km in winter. Range depends on a lot of factors.
- How much did it cost?
  - C$33,730 (incl. tire levy, admin fee, HST; after rebates)
- What rebates?
  - Federal $5000 + Provincial $3000 on most new EVs purchased

More Questions

Second level

- How much does the electricity cost?
  - At home: $7.46 for 400 km with time-of-day rates; $11.51 on basic tariff
  - On a roadtrip: $15 to $40 for a fill-up
- How is it in winter?
  - You can lose 30% range at -10ºC in winter (varies by model)
  - The low centre-of-gravity and weight distribution give great handling
  - Winter or all-weather tires are highly recommended

More Questions

Third level

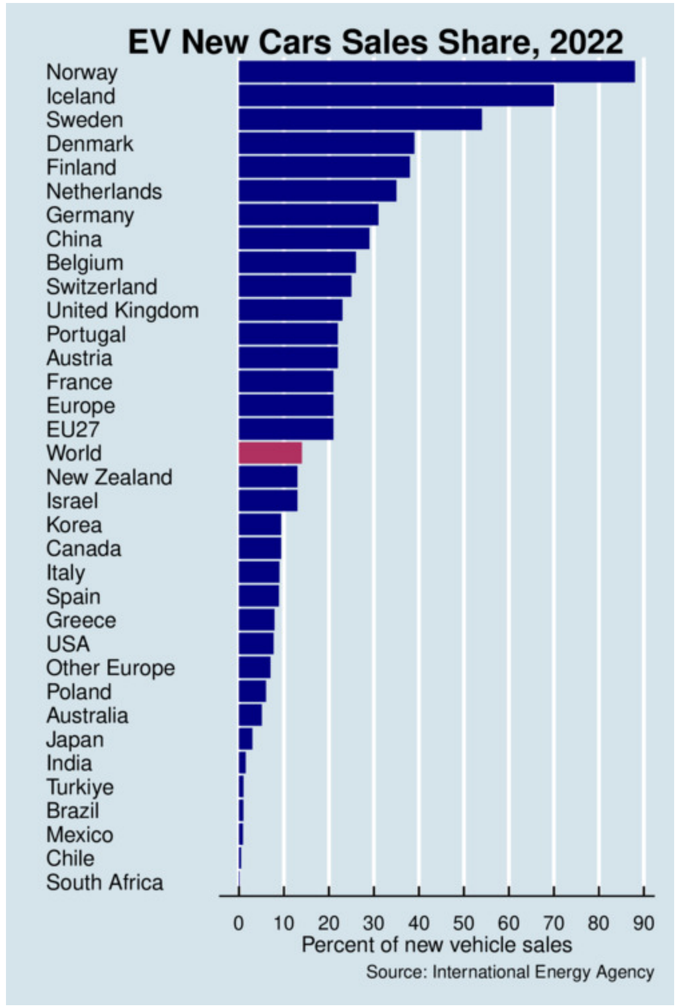
- Have you gone on any longer trips? How did that go?
  - I’ve been to Corner Brook twice (2200 km ea.) and Fredericton three times (1000 km ea.)
  - You have to plan for longer trips with the Bolt; use Plugshare and ABRP
- When will you need to replace the battery? How much would that cost?
  - All EVs have an 8-year battery warranty
  - Batteries are designed to last 20 years or more
  - There are Bolt taxis/Ubers with over 400,000 km on them
  - I have no idea what a new battery will cost in 2042.

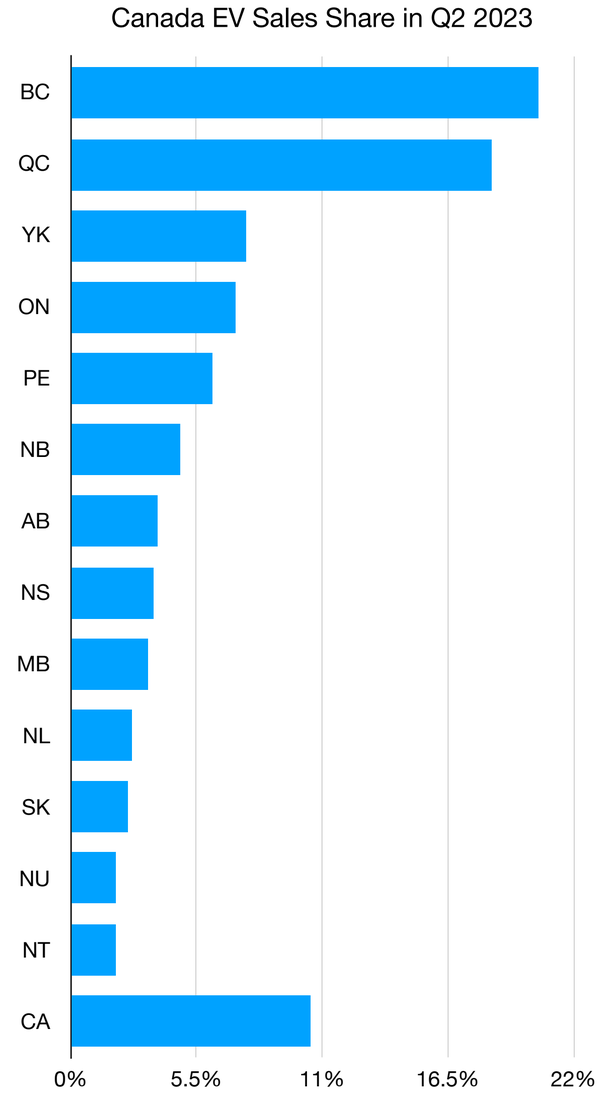
Trends

Adoption

Sales by Region

- Norway has reached ~91% EV sales in Q1 2024
- Canada is below the world average in EV adoption
- Nova Scotia is below the Canadian average

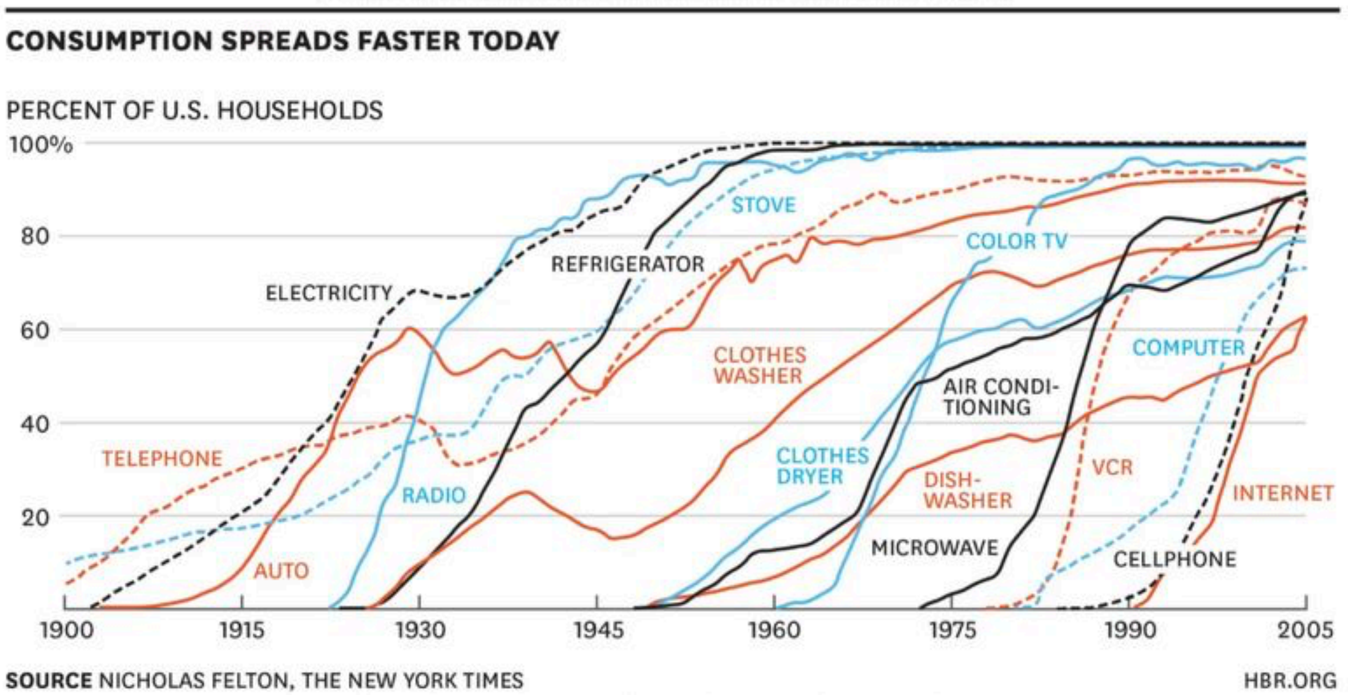




New Tech History

The S-Curve

- Successful new tech starts out slow, ramps up, and then tapers to ~90+% usage
- Cars are expensive and have a 20 year lifespan, so reaching 90% will take decades
- There will be ups and downs

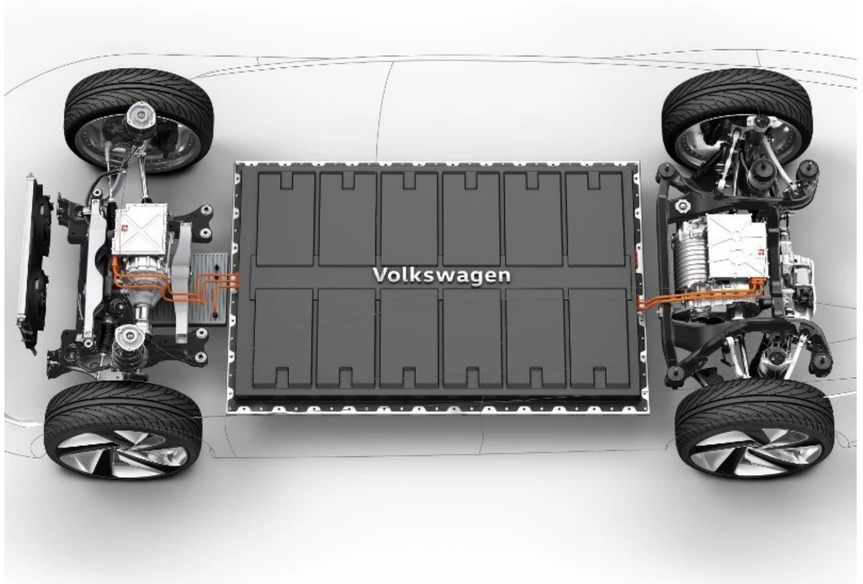


Lingo

Types of cars

By drivetrain

- ICE – Internal Combustion Engine (gasoline, diesel, propane, alcohol)
- HEV – Hybrid Electric Vehicle
  - Engine & internally chargeable battery
- PHEV – Plug-in Hybrid EV
  - Externally chargeable battery & engine
  - Hybrids come in two types: parallel and serial
- FCEV – Fuel Cell EV (hydrogen)
- BEV – Battery-only EV



Pros / Cons

Advantages

BEVs

- Quiet, no vibration
- Quick acceleration
- Great handling
  - Low center of gravity; even front/rear weight distribution
- No fumes
  - Turn on in garage, at drive-ins
  - Leave on while shopping (dog mode)

- Frunks (front trunk)
- Regeneration
- One-pedal driving
- Little scheduled maintenance
- Low fuelling cost
- Safe in crashes

Disadvantages

BEVs 2024

- Higher initial price
- Slower refuelling (charging)
- Limited charging networks
- Lower range
- Fewer model choices

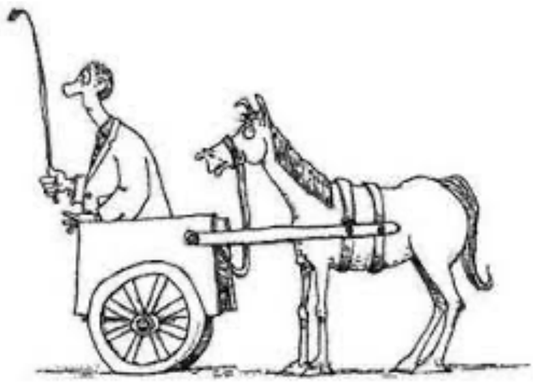
These will get better in coming years

- EVs are getting too powerful
  - Hummer EV is 10,000 lbs and does 0-100 km/h in ~3 seconds
  - Parking lot fender benders can become mass casualty events

This may get worse

Reworked History 😉

Imagine Electric Cars Were First



- Is it true that a gasoline car …
  - is powered by a flammable and toxic liquid?
  - produces dangerous fumes that can suffocate people in a garage?
  - has to have an oil change service every 8000 to 12,000 km?
  - can’t be refuelled at home?
  - vibrates the whole time it is turned on?
  - can’t recover range when it slows down or goes down a hill?

Models

Available 2024

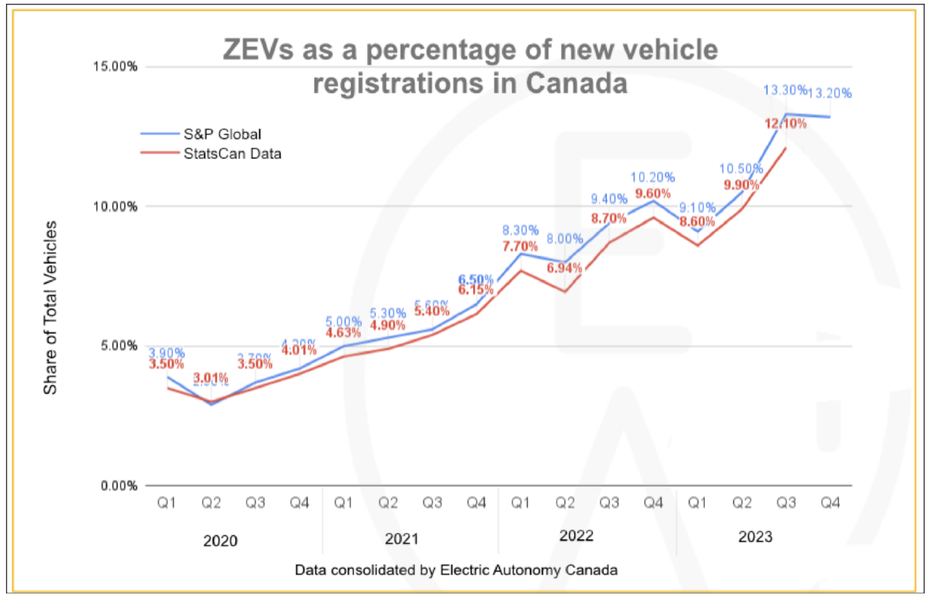
In Canada

- There are 25 brands currently being sold
  - Audi, BMW, Cadillac, Chevrolet, Ford, Genesis, GMC, Hyundai, Jaguar, Kia, Lexus, Lucid, Mazda, Mercedes-Benz, Mini, Nissan, Polestar, Porsche, Rivian, Subaru, Tesla, Toyota, Vinfast, Volkswagen, Volvo
- They include luxury, compact, SUV, sportscars, and large pickup trucks
  - Currently no minivans, small pickups, long-haul pickups, or small two-seat sportscars
- Include FWD, RWD, AWD, and sometimes your choice (Chevy Blazer)
  - Possible because AWD = FWD + RWD = 2 motors

Popularity

In Canada

- About 9.0% of new car sales are BEVs in Q4 2023 (StatsCan)
  - + 3.0% PHEV = 12.0% “electrified”
- Most popular models (Q4 % of sales):
  - Tesla Model Y 23%
  - Tesla Model 3 23%
  - Chevrolet Bolt EV/EUV 11% (discontinued until 2025)
  - Volkswagen ID.4 5.2%
  - Hyundai Kona 4.8%



Tesla

Model 3 / Y

- One large central screen
  - ✦ Almost no physical buttons, dials, or stalks
- RWD, or AWD using 2 motors
- Front trunk (“frunk”)
- Pioneering self-driving
- Heat pump
- Die-cast construction
- Minimum $54k / $58k + tax - rebates

Ford

F-150 Lightning

- Full-sized pickup
- Huge front trunk
- Built-in inverter for AC output
  - 10 × 120 V plus 1 × 240 V outlets
  - Home generator feature (9.6 kW using CCS1)
  - Recharge electric cars, boats, motorcycles
- Minimum $62k + tax - rebates

Hyundai & Kia

Ionic 5, 6, & EV 6

- 800 V architecture
  - Faster 320 kW charging
- V2L (Vehicle to Load)
- Heat pump
- RWD & AWD
- Minimum $49k, $55k, $56k + tax - rebates

Rimac

Nevera

- Electric supercar
- One motor at each wheel (4 motors)
- 1,813 combined HP = 1.34 MW of power
- 0–100 km/h in 1.85 seconds
- Top speed 415 km/h (258 mph)
- Still gets the equivalent of 4.4 L/100 km (53 MPG_e)
- $3,000,000 price

Costs

Cost of Ownership

Nova Scotia Comparison

Electric Cars

	Bolt EUV	Tesla M3	Kona EV
Cash Price	38,000	54,000	53,300
5 year TCO	37,200	50,580	38,900

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Gasoline Cars

	Chevy Trax	Audi Q5	Kona Pref.
Cash Price	24,700	63,300	32,700
5 year TCO	44,000	60,800	39,900

- CAA calculations in C$
  - 15% downpayment, 85% loan
  - incl. HST and EV rebates ($7k)
  - 2023 model year
  - Based on 20k km/year
  - 45% city, 55% highway
  - Includes depreciation, maintenance, insurance, and fees for Nova Scotia

Charging Costs

EVSE and DCFC

- An L1 or L2 EVSE may come with the car
  - There may also be a charging credit (GM: $750)
- EVSEs cost $500 to $1500 to buy
  - Be sure to buy a UL Listed device (or CSA)
- You may need to have a 240 V outlet installed
  - Cost can vary greatly, from $200 DIY to $8000 worst case
- L3 (DCFC) charging if in an apartment or condo without L1/L2
  - Plan on the time and cost: $15/hr or more, up to $0.70/kWh

Current Churn

Other Vehicles

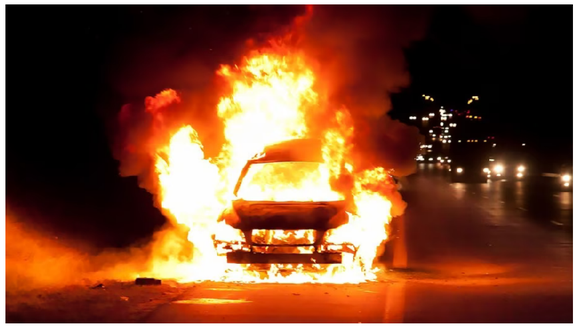
Electrification of society

- Ferries, cargo ships (Norway)
- Aircraft (Harbour Air seaplane, EHang, Boeing, …)
- Transport trucks (Tesla Semi, Mercedes, Kenworth, Freightliner, Volvo, …)
- Delivery trucks (Ford e-Transit, GM Brightdrop, Amazon, USPS, …)
- Buses, city and school (Lion, Ebusco, BYD, …)
- Motorcycles / scooters (Zero, Gogoro, Honda, …)
- Power boats, sailboats, dinghys, fishing boats
- Bicycles, unicycles, skateboards, rollerskates
- Tractors, snowblowers, lawnmowers, wheelbarrows

Discussion

Myths

About the cars



- Electric cars catch fire a lot
  - ICE cars catch fire 6 to 80 times more often
  - Lithium fires are harder to put out than gasoline fires
- You could get stuck in a snowstorm on the highway
  - Chevy Bolt: ~2 kW heater and 65 kWh battery lasts ~ 33 hours
  - Honda Fit: 1.5 L engine with 40 L tank lasts ~ 36 hours
- Mining cobalt kills children in the DR Congo
  - 60% of shipping EVs use no cobalt; the rest average 5% in the battery

Myths

About the system

- Adding all those EVs will collapse the power grid
  - Charging at night increases grid reliability and reduces electricity production cost
- EVs are worse for the environment because electricity comes from coal
  - Even using coal, EVs produce less lifetime GHGs than gas cars
  - Coal is being rapidly replaced by renewables in the grid

Sourced from the EPA and Clean Energy Canada.

Discussion

Topics

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