

What to Consider When Purchasing a New or Used Plug-In Vehicle

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- EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including **reliability, efficiency, affordability, health, safety** and the **environment**.

- **EPRI members** represent 90% of the electricity generated and delivered in the United States with international participation extending to nearly **40 countries**.



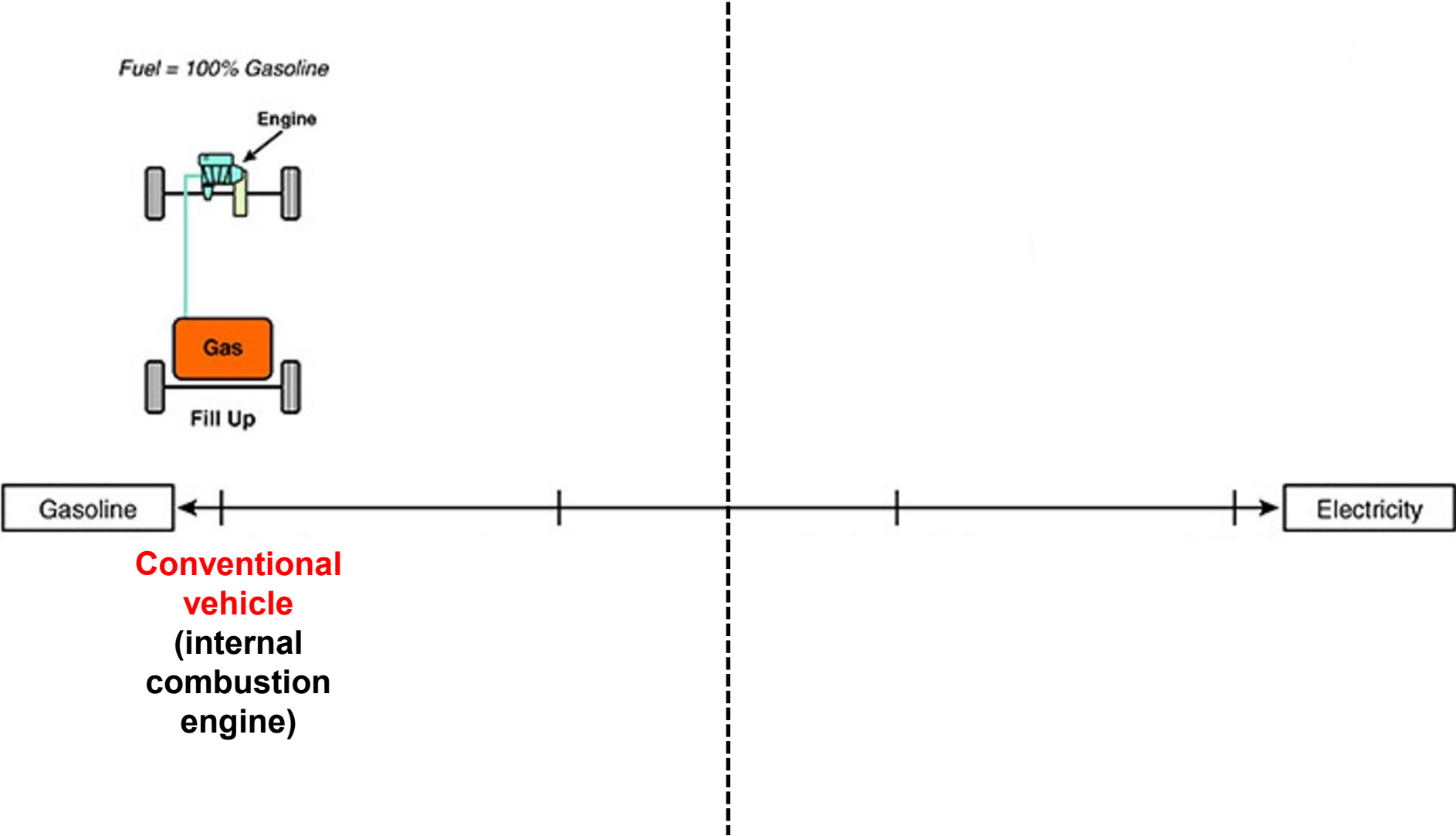
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Agenda

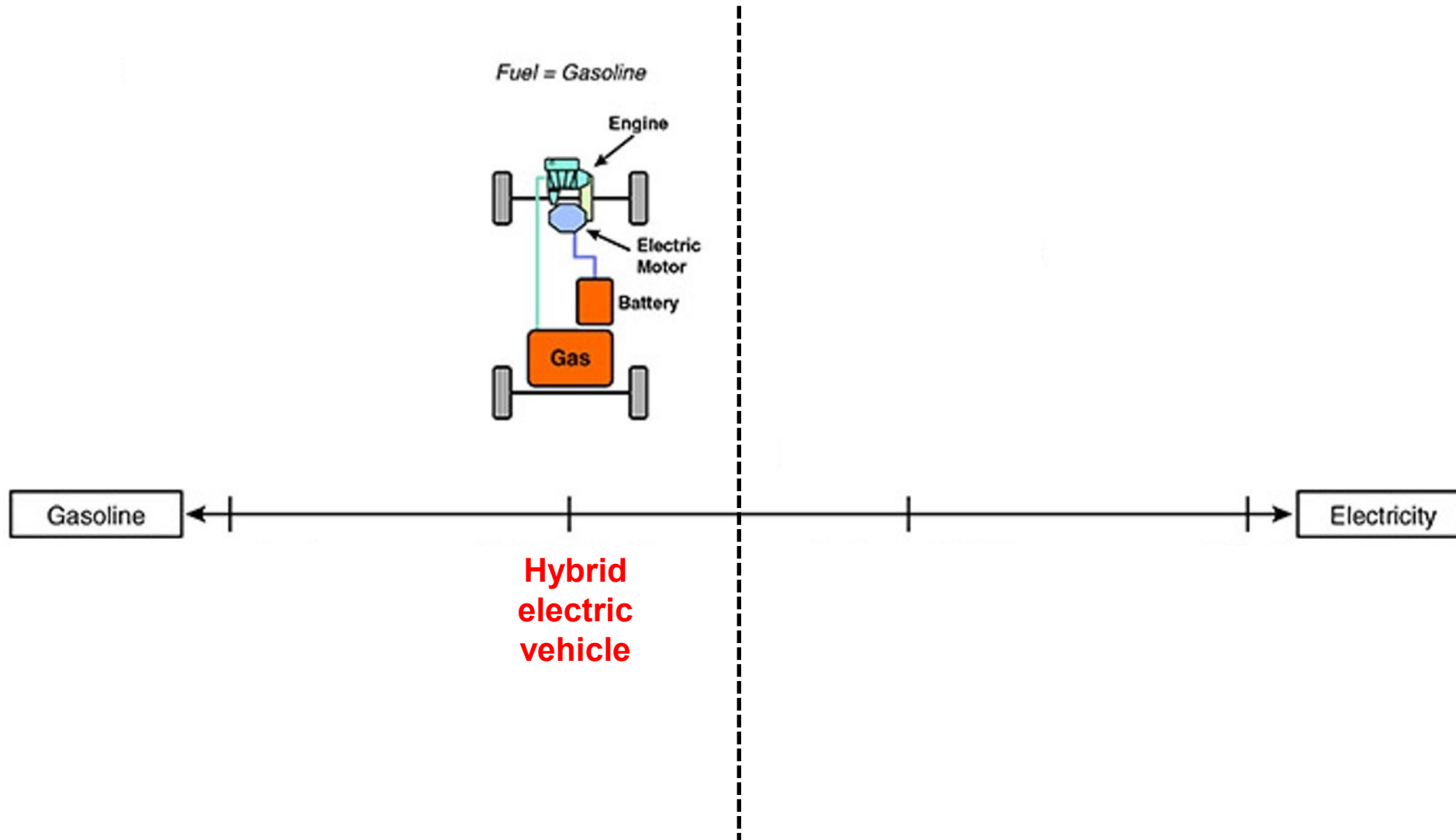
- Two types of Plug-in Electric Vehicles (EV)
- Batteries
- EVs on the Market
- Charging
- What Else to Consider
- Purchase vs. Leasing
- Pros and Cons of Used EVs
- Future EVs
- Q&A



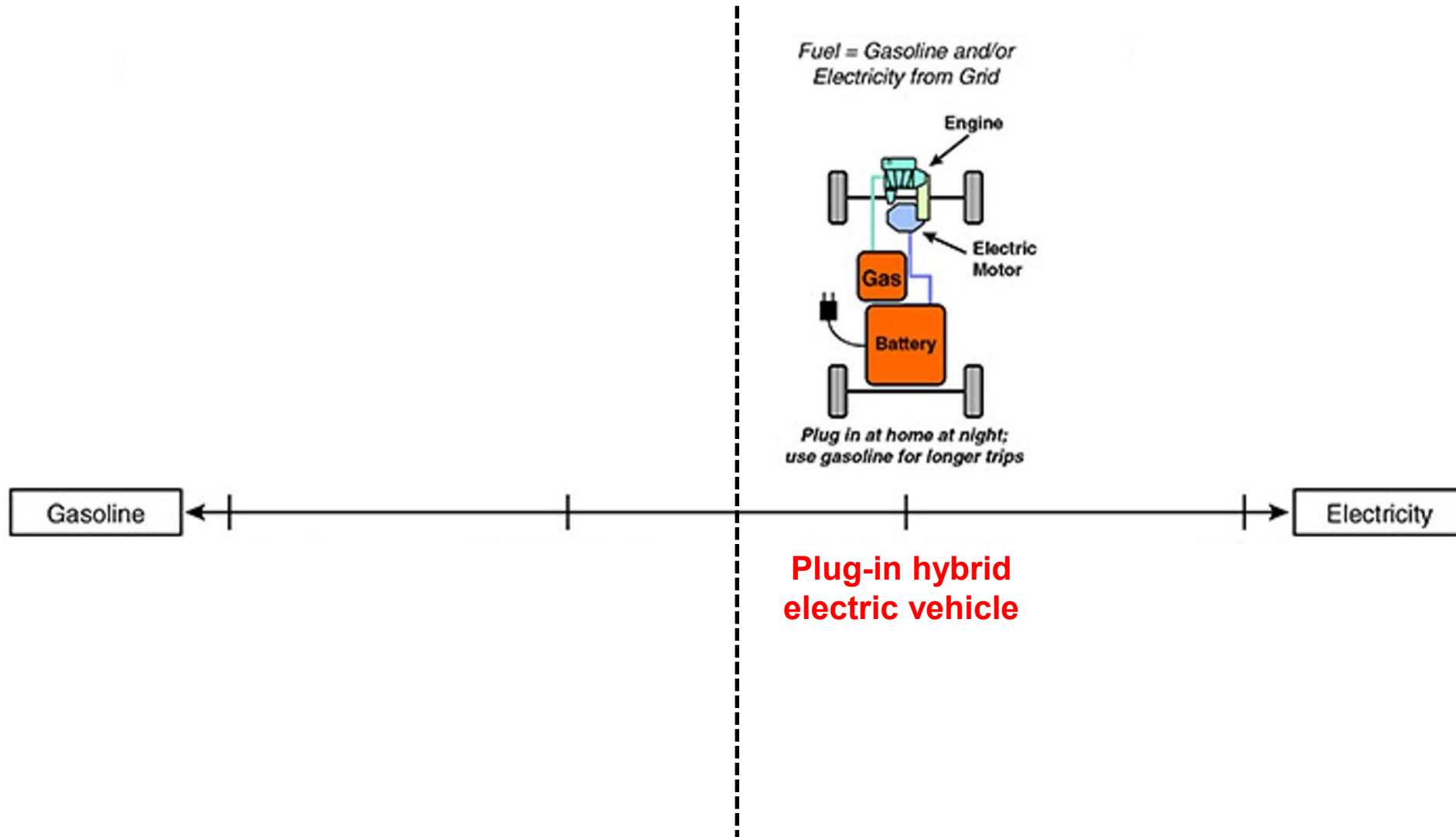
Choices: Conventional Vehicle



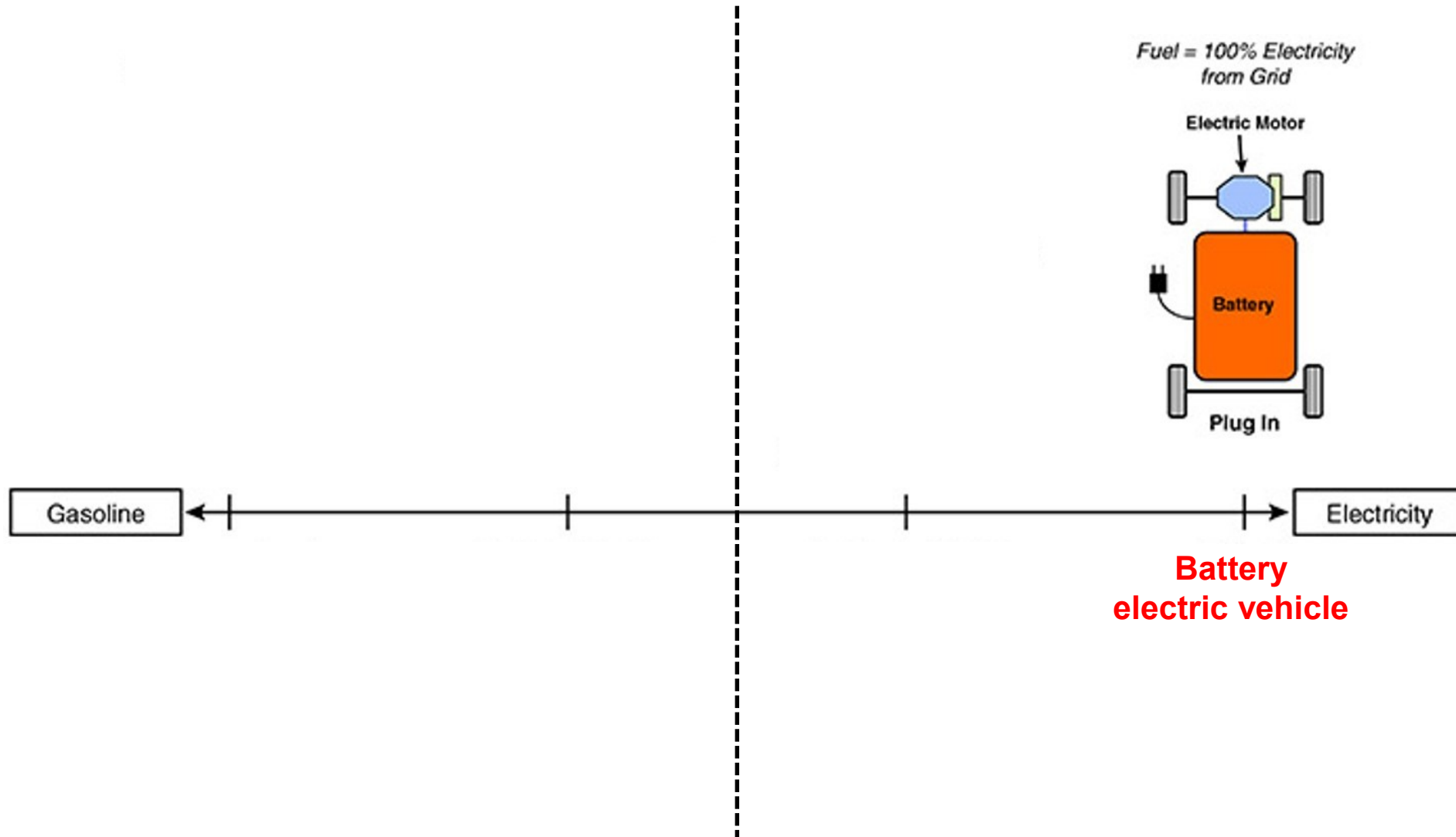
Choices, Choices: Hybrid Electric Vehicle (HEV)



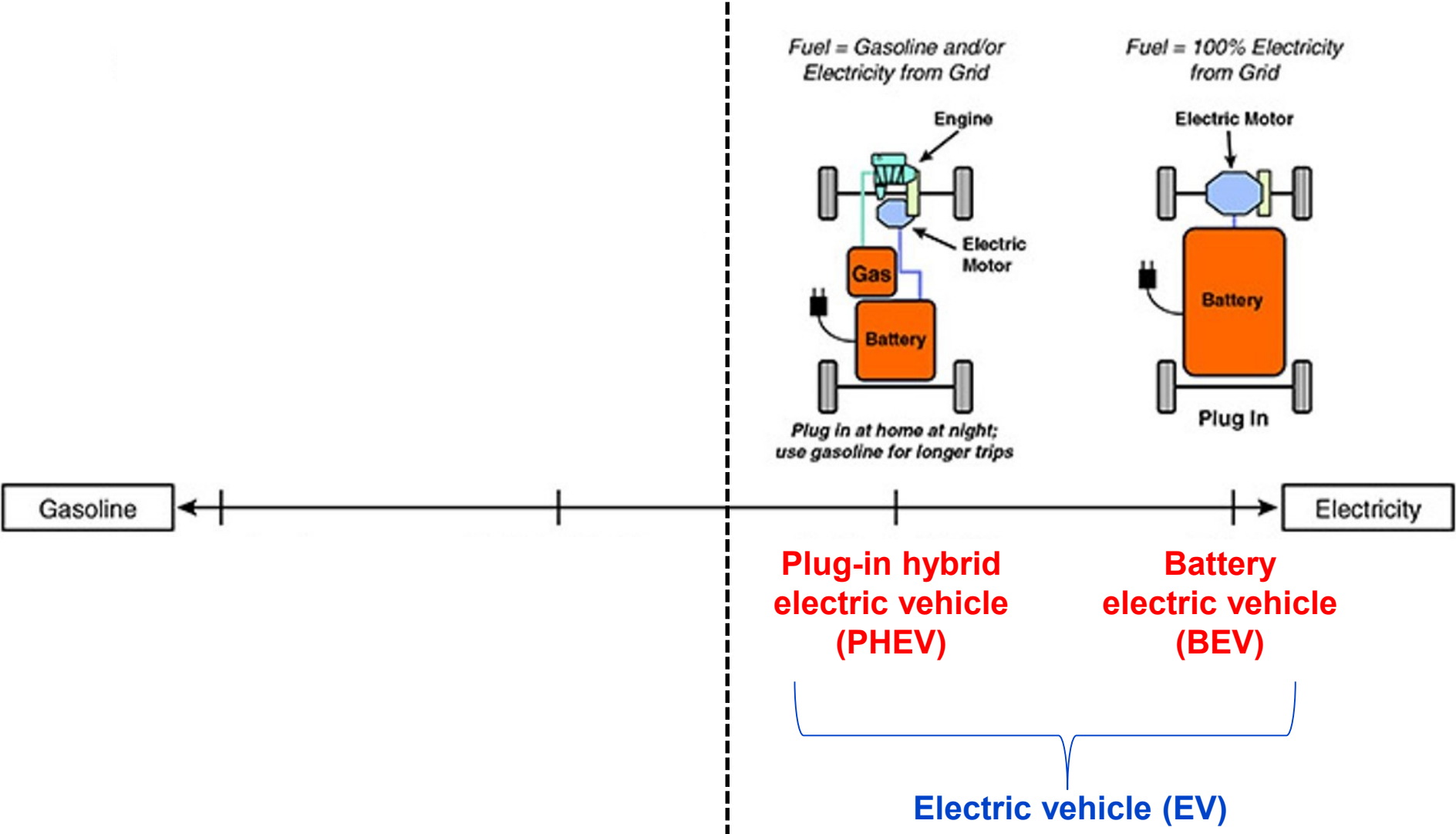
And More Choices: Plug-in Hybrid Electric Vehicle (PHEV)



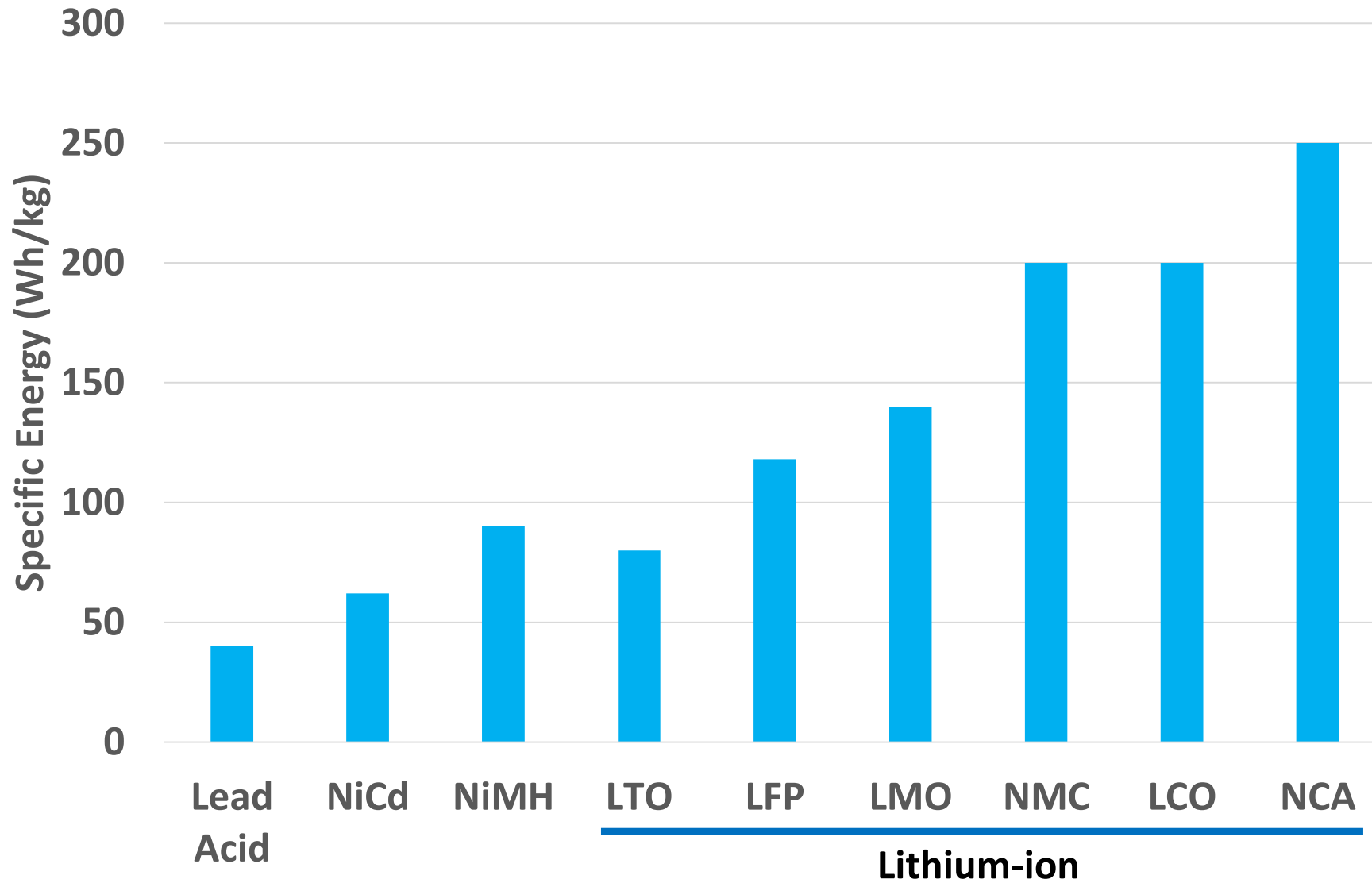
One More... Battery Electric Vehicle (BEV) – “all-electric”



Electric Vehicle (EV) – means either PHEV or BEV

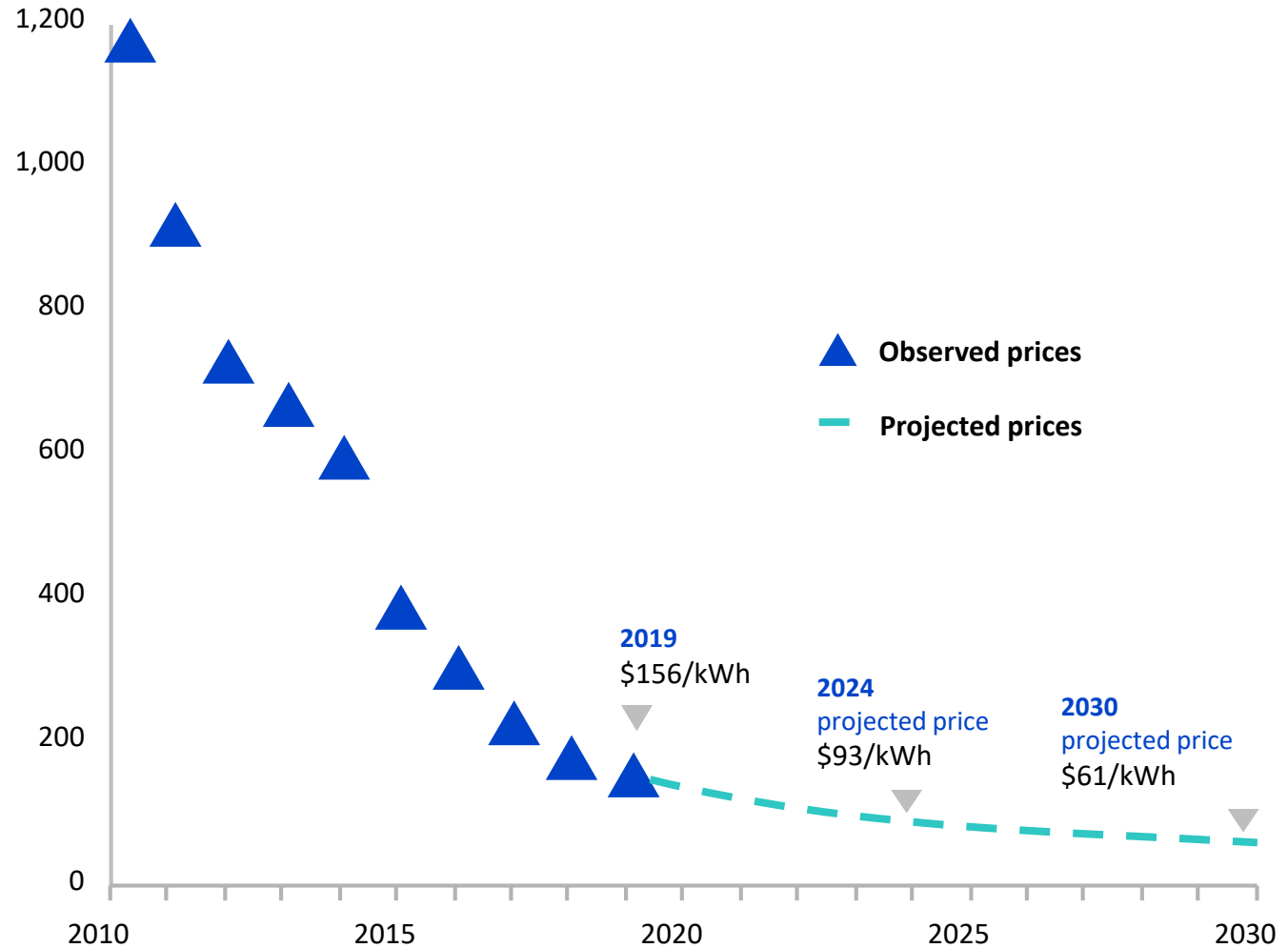


Today's EVs use Lithium-ion Batteries



EV growth is driving battery costs down

Lithium-ion battery pack price (real 2019 \$/kWh)



Source: BNEF 2019 Lithium Ion Price Survey

EPRI Consumer Guide to EVs



CONSUMER GUIDE TO ELECTRIC VEHICLES



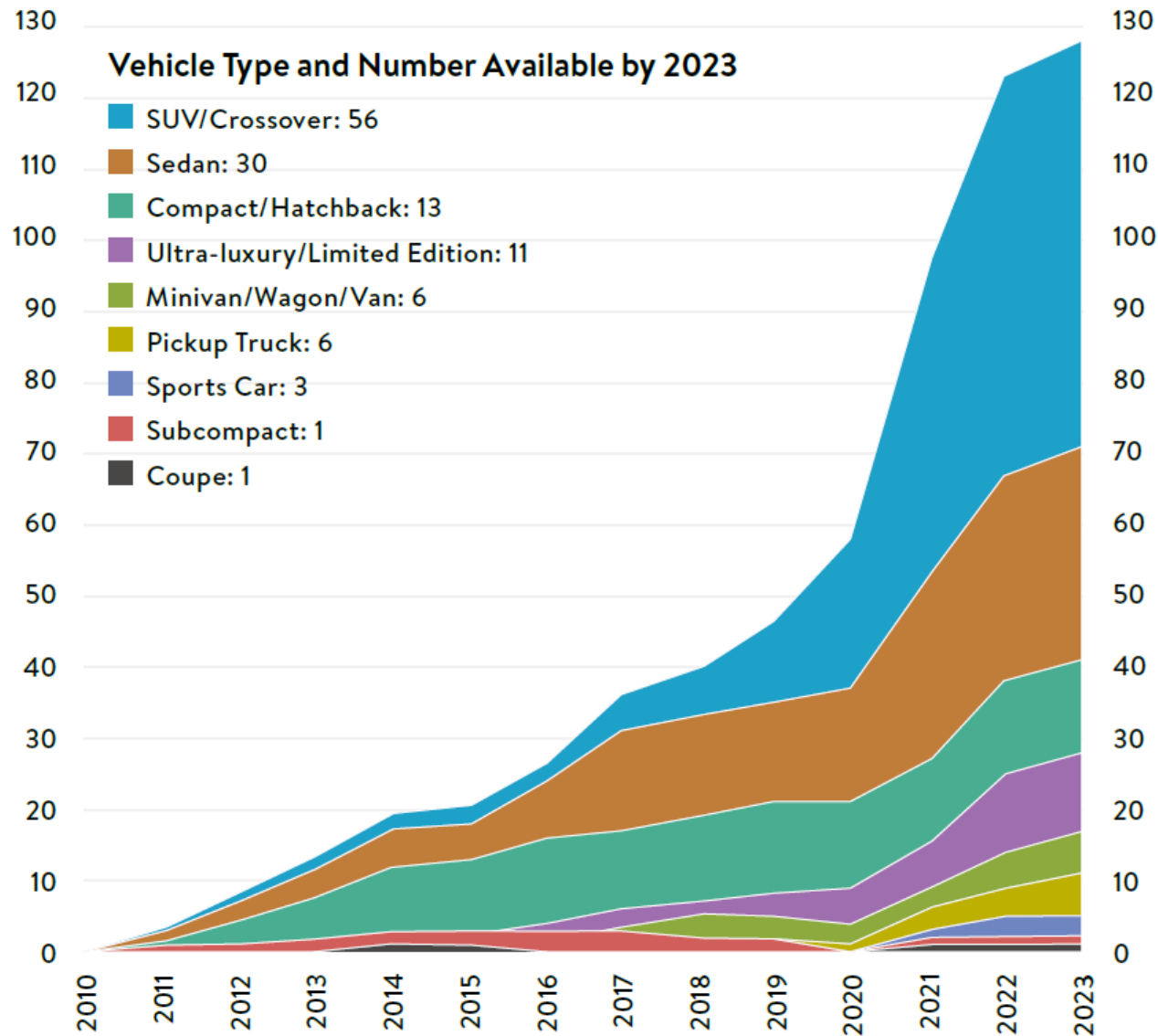
APRIL 2020

See link provided by Lincoln Electric, or:

- <https://www.epri.com/research/products/3002018113> (English)
- <https://www.epri.com/research/products/3002019552> (Spanish)

Online and mobile versions under development

EPRI Consumer Guide to EVs



- Some EV models are only available in select states.
- However, some “unavailable” EVs can be ordered through a local dealer.

BATTERY-ELECTRIC VEHICLE

MODEL NAME	RANGE (MILES) ¹	WHERE
SUV/CROSSOVER		
Audi e-tron	222	Nationwide
Jaguar I-Pace	234	Nationwide
Tesla Model X	258-328	Nationwide
Tesla Model Y	315	Nationwide
COMPACT/HATCHBACK		
BMW i3	153	Nationwide
Chevrolet Bolt EV	259	Nationwide
Mini Cooper SE	110	Nationwide
Nissan Leaf and Leaf Plus	150 and 226	Nationwide
Hyundai Ioniq Electric	170	Select Markets
Hyundai Kona Electric	258	Select Markets
Kia Niro EV	239	Select Markets
Volkswagen e-Golf	123	Select Markets
SEDAN		
Tesla Model 3	220-330	Nationwide
Tesla Model S	287-373	Nationwide
SUBCOMPACT		
Fiat 500e	84	Select Markets
SPORTS CAR		
Porsche Taycan 4S and Taycan Turbo	201	Nationwide

Pricing, Range, Charging

Two examples from the Consumer Guide



2020 Chevrolet Bolt EV

 Battery-electric  Compact/Hatchback

EPA electric range: 259 miles

Range/hour of charging: 26 miles

Fast charging: 100 miles in 30 minutes

Starting MSRP: \$36,620



2020 Chrysler Pacifica Hybrid

 Plug-in hybrid  Minivan/Wagon/Van

EPA electric range: 32 miles

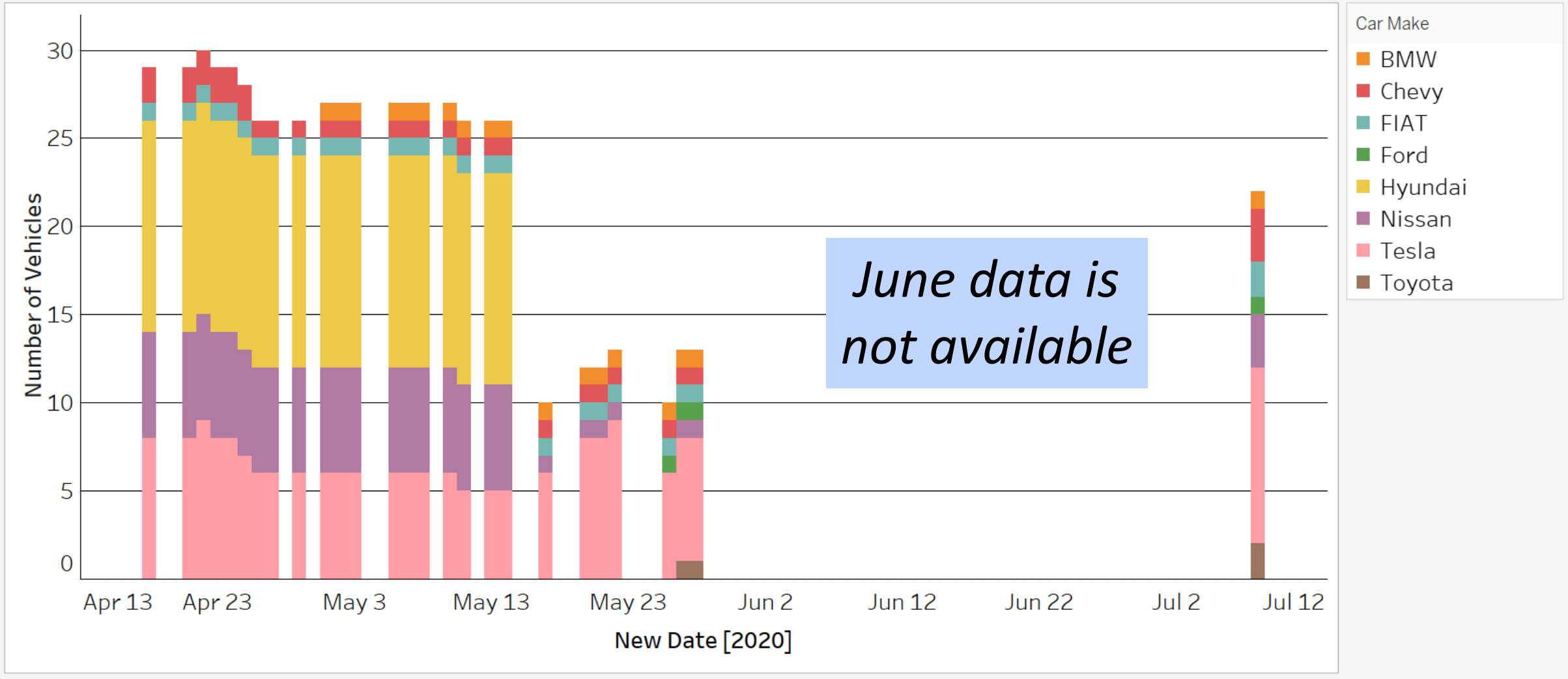
EPA total range (gas+electric): 520 miles

Range/hour of charging: 16 miles

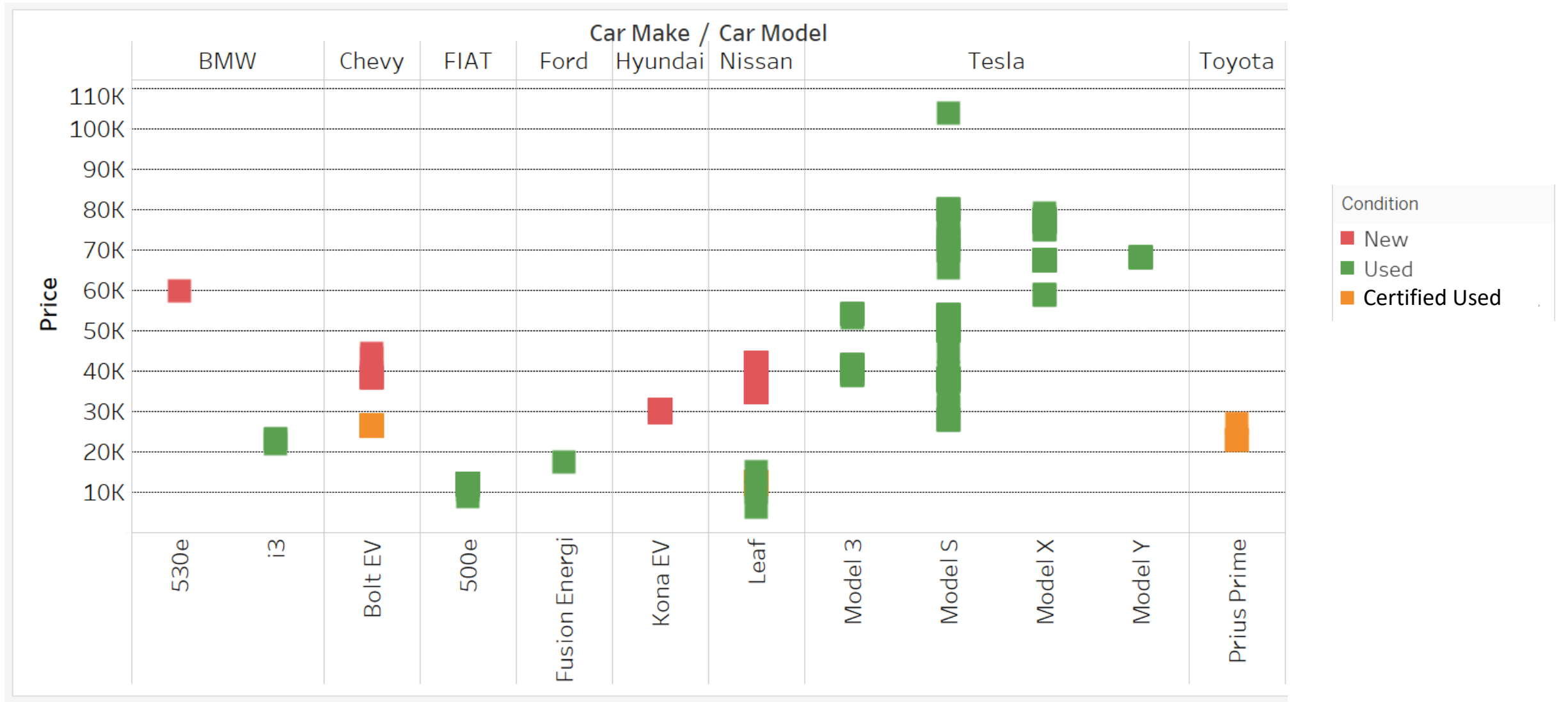
Starting MSRP: \$39,995

Lincoln-area EV Availability: New and Used

Number of EVs advertised each day on cars.com



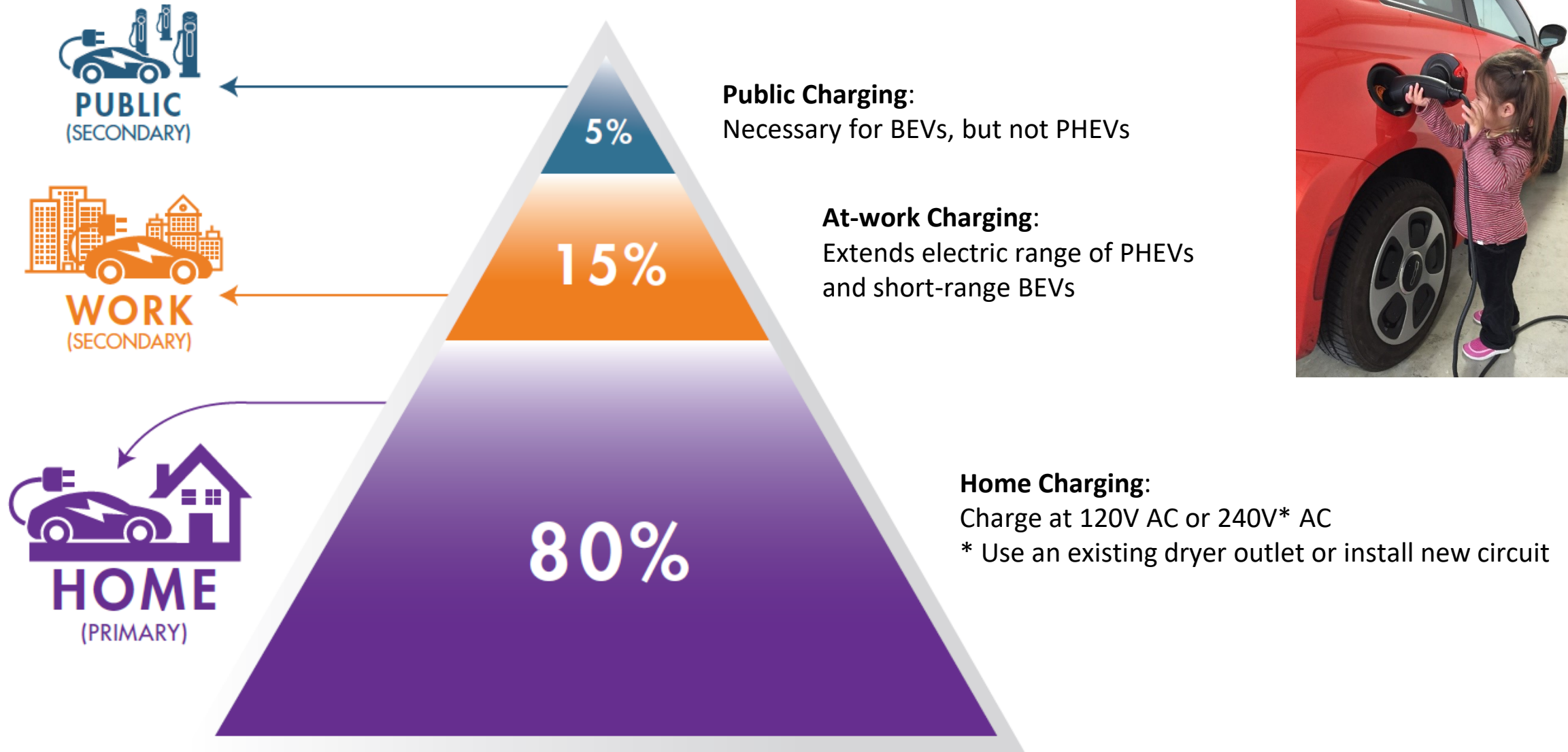
Lincoln-area EV Pricing: New and Used



Source: EVs advertised on cars.com

The bulk of EV charging will be done at home and work

Some public charging is DC fast charging



Public Charging Locations around Lincoln

The screenshot displays the PlugShare application interface. At the top, there are navigation options for 'EN', 'Login', and 'Register'. A search bar is present with the text 'Search for a Charging Location'. Below the search bar is a 'Legend' and 'Filters' section. The filters are categorized into 'Plugs (7 of 8)' and 'Networks (19 of 19)'. The 'Plugs' section includes icons for Supercharger, CCS/SAE, CHAdeMO, J-1772, Tesla, Tesla (Roadster), NEMA 14-50, and Wall. The 'Networks' section lists various providers such as BC Hydro EV, Blink, ChargePoint, Circuit Electrique, Electrify America, Electrify Canada, EV Connect, EVgo, FLO, GE WattStation, Greenlots, and IVY. The main map area shows Lincoln, Nebraska, with 21 charging locations marked by green icons. Landmarks like Lincoln Airport, Pinnacle Bank Arena, University of Nebraska-Lincoln, and various golf courses are visible. The bottom of the screen shows map controls, a scale bar, and copyright information for Recargo, Inc. (© 2020).

What to Consider

- Driving needs and lifestyle
 - No worries or possible inconvenience: PHEV
 - No gasoline: BEV
- Costs and benefits
 - *More on the next slide*
- Environmental benefits
 - Less energy consumed
 - Lower emissions
 - For more information, see:
“Environmental Assessment of a Full Electric Transportation Portfolio”
<https://www.epri.com/research/products/3002006881>



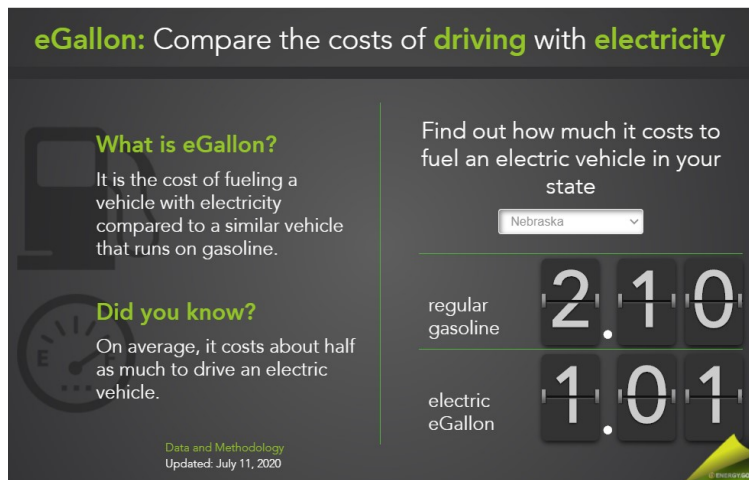
Costs and Benefits

■ Costs

- Higher sticker prices
- Charging infrastructure
 - 120V “Level 1” charging - no cost
 - 240V “Level 2” at home
 - Multi-unit residences may require additional effort to charge at home
 - Inconvenience if infrastructure is not available where you need it

■ Benefits

- Quiet, smooth, responsive performance
- Electricity is generally a lower-priced “fuel”
 - and domestically-produced
- Incentives
 - Federal tax credit (phased out for some)
 - Local incentives
- Maintenance¹
 - Fewer or no oil changes
 - Less brake wear
 - Electric drivetrains often more reliable
- Home charging convenience
 - Fewer or no trips to the gas station
- Environmental benefits



www.energy.gov/maps/egallon

¹ <https://qz.com/1571956/new-york-city-says-electric-cars-cheapest-option-for-its-fleet/>

Purchase vs. Lease

- Purchase
 - You own the car
- Leasing
 - Like a long-term rental
 - May be a “good deal” if the dealer/manufacturer applies incentives
 - May have tax benefits for business use
 - Option to purchase (in most cases)



Pros and Cons of Used EVs

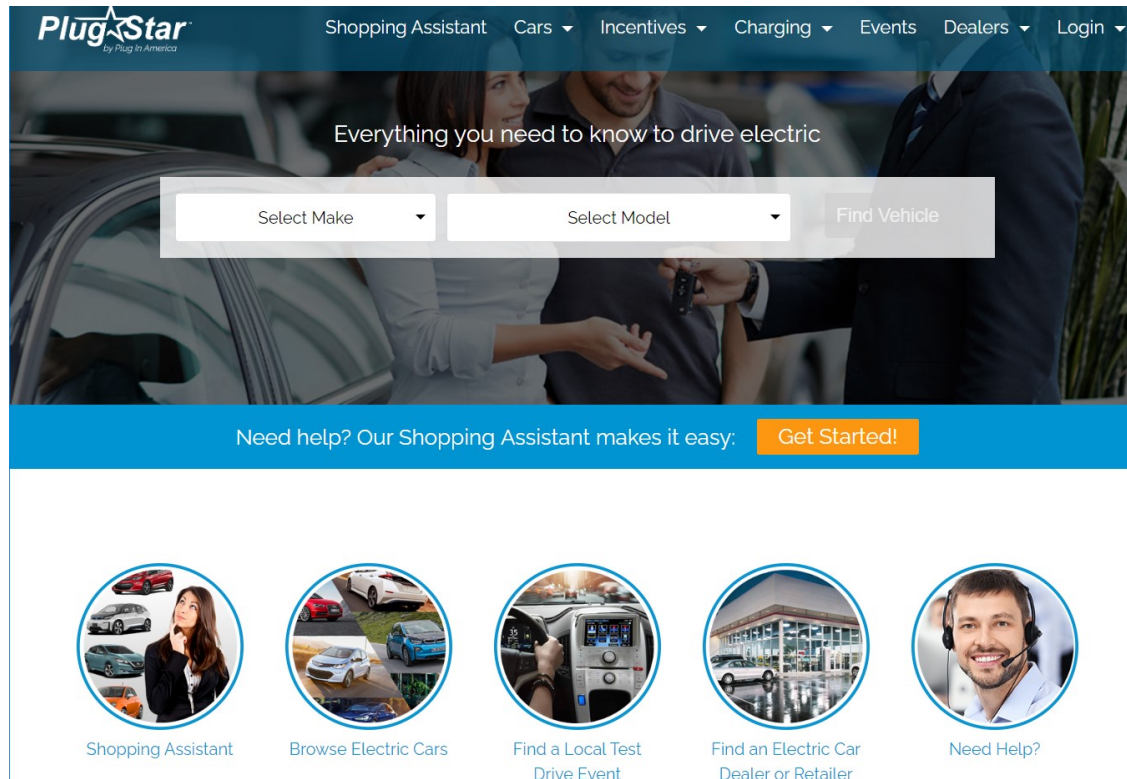
- Pros

- Significant savings vs. new
- EVs are generally highly reliable
- In case of Tesla, can gain capability over time

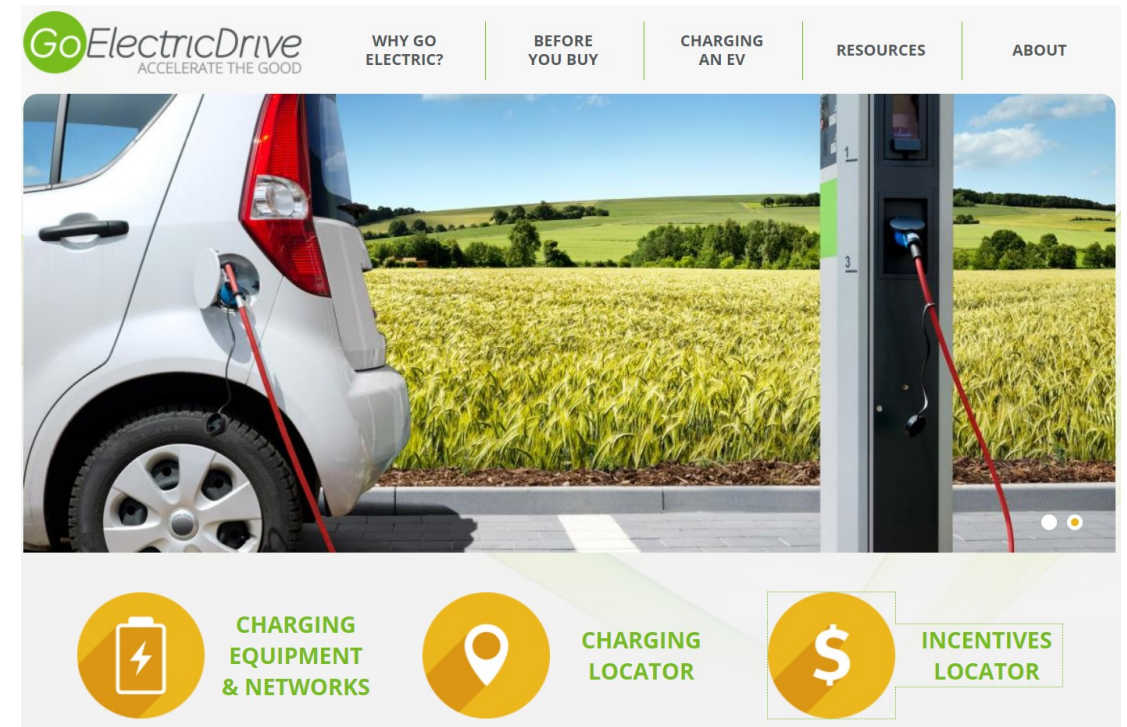
- Cons

- It's not new
- Tax credit not available
- EV technology is changing rapidly
- Possible battery degradation on certain models

Other resources



www.plugstar.com



www.goelectricdrive.org

Also:

- www.fueleconomy.gov
- afdc.energy.gov/fuels/electricity.html
- afdc.energy.gov/calc

More electric crossovers, SUVs, and trucks are coming in 2020-2021



2020 Ford Escape PHEV



2021 Jeep Wrangler PHEV



2021 Rivian R1S BEV



2021 Ford Mustang
Mach-E BEV



2021 Rivian R1T BEV



2020 Toyota RAV4 Prime PHEV

Photos: Cedric Daniels, Alabama Power, a division of Southern Company (January 2020); Dan Bowermaster EPRI (November 2019)

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