Trilogy Roadrunners Car Club

Automotive Industry Updates
May 18th, 2021

Prepared by: Randy Rollo

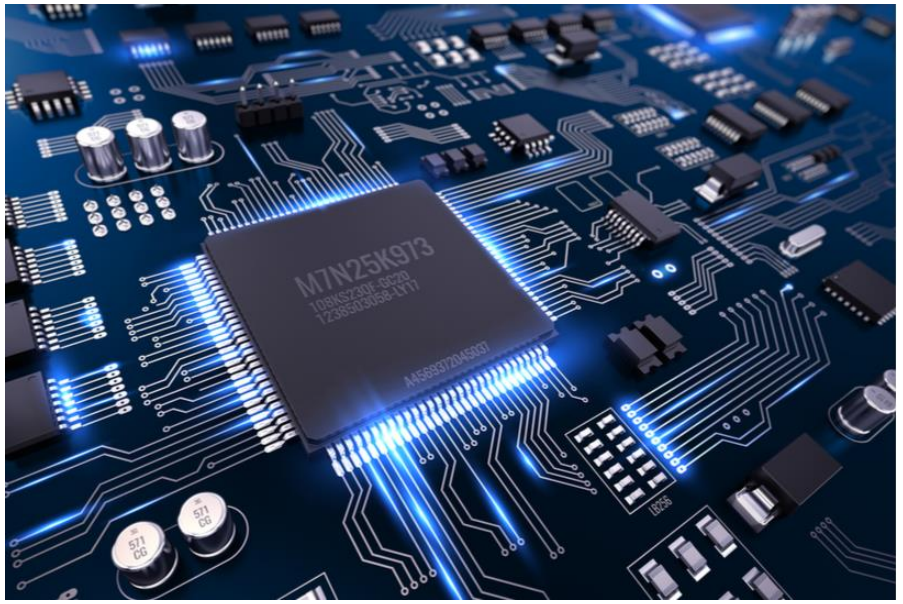
Menu

- Who ate all the Chips?
- Acronym Soup; HEV, PHEV, BEV, FCEV?
- Is the ICE melting?

Who ate all the Chips?

Semiconductor shortages across the Automotive Industry

Supply Chain Shortages



Semiconductor shortages caused by redirected product demand. Everyone stayed home and got on the Internet.

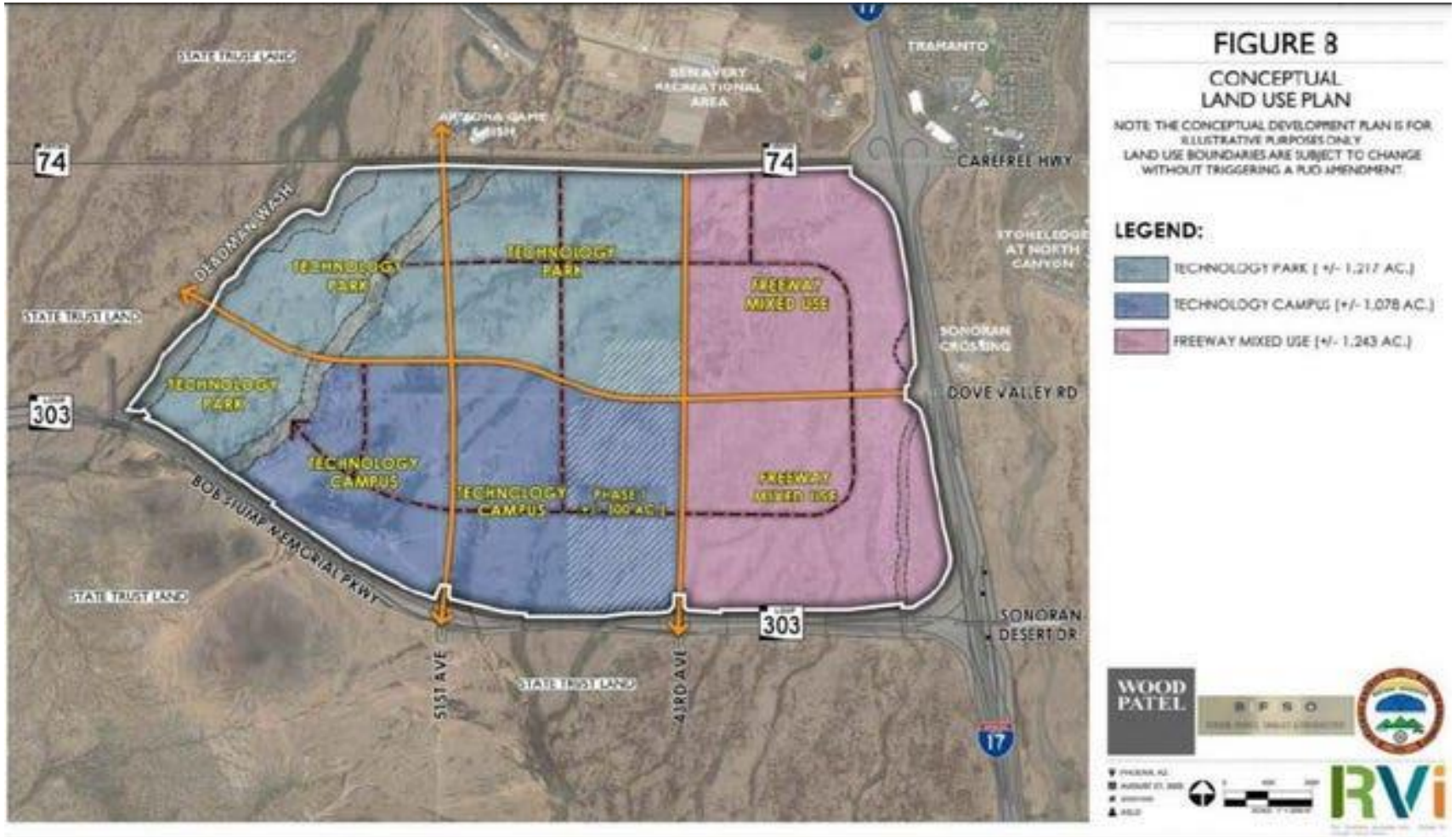
When the auto industry stopped ordering, the chip companies shifted to computers, game consoles, internet infrastructure devices etc.

Major automobile chip suppliers include:

- Texas Instruments Inc. (Compounded by Texas blizzard.)
- Japan’s Renesas Electronics Corp. (Compounded by March factory fire.)
- Analog Devices Inc.
- Netherlands-based NXP Semiconductors NV.
- Germany’s Infineon Technologies AG.
- South Korea’s Samsung Electronics Co.

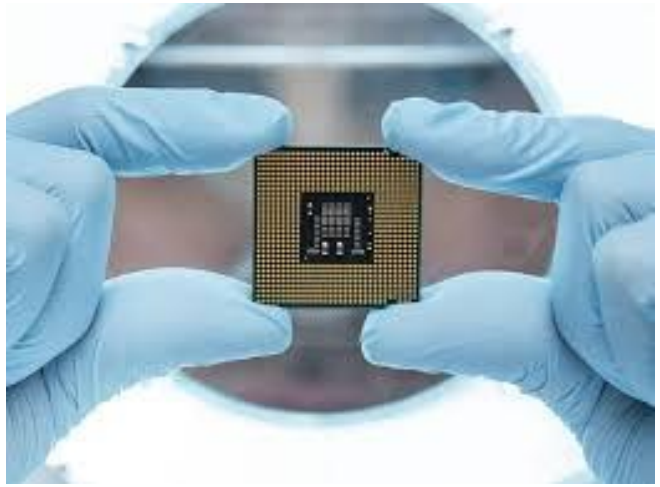
Taiwan Semiconductor Manufacturing Co.

Phoenix plant likely three times larger than originally announced at $35B



No short term solution

- Shortages expected to last well past 2021. ☹
- Limited new car inventory creates higher sale prices. ☹
- Used car prices are rising as much as 18% already. ☹
- Intel & TSMC are in discussions with Automotive Manufacturers. ☺



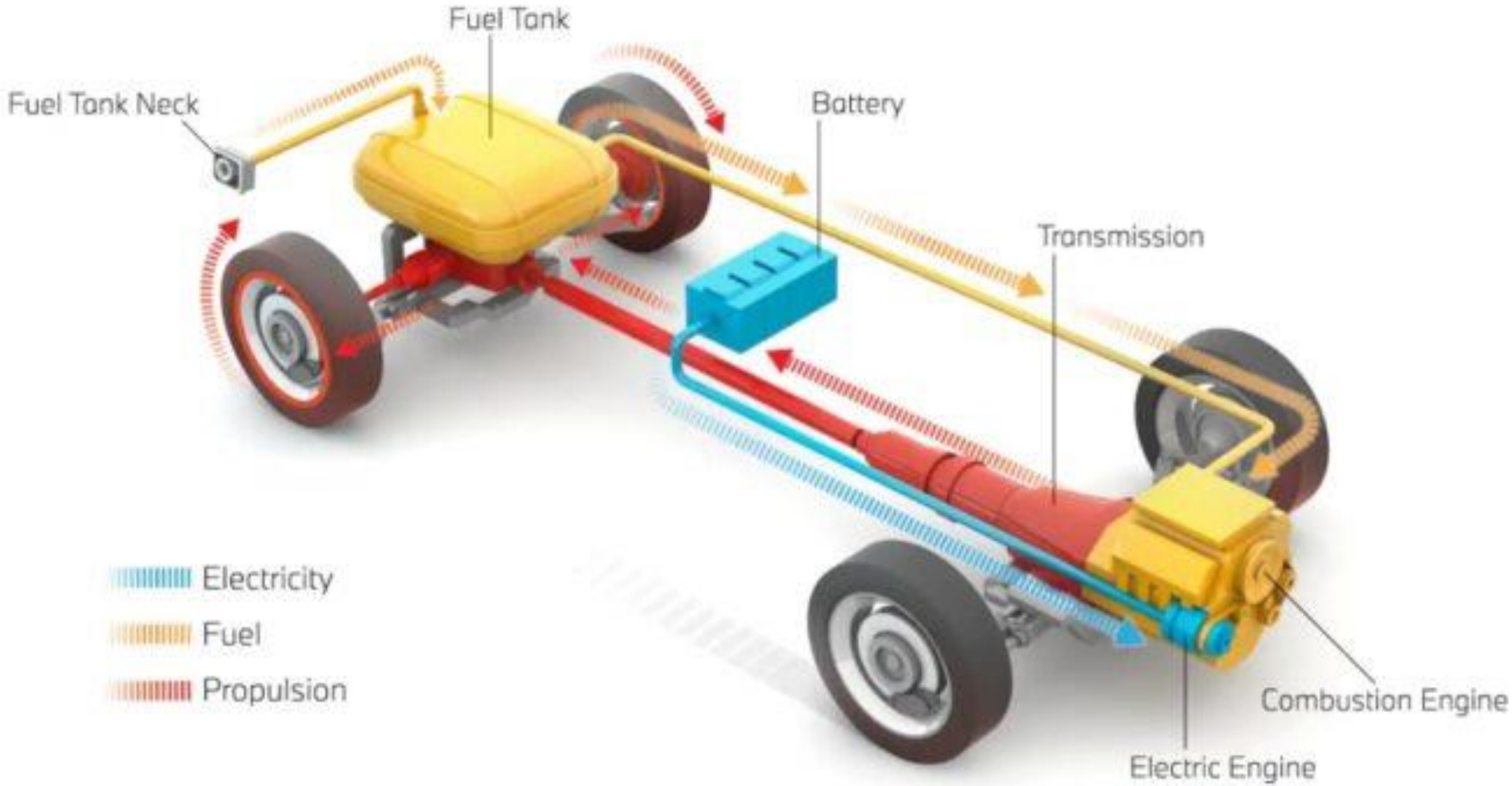
Acronym Soup: HEV, PHEV, BEV, FCEV.

The key differences between Electric Vehicle (EV) propulsion options.

HEV

Hybrid Electric Vehicle is where a small electric motor assists the Internal Combustion Engine (ICE). Under light load, for instance during initial acceleration, only electricity is consumed.

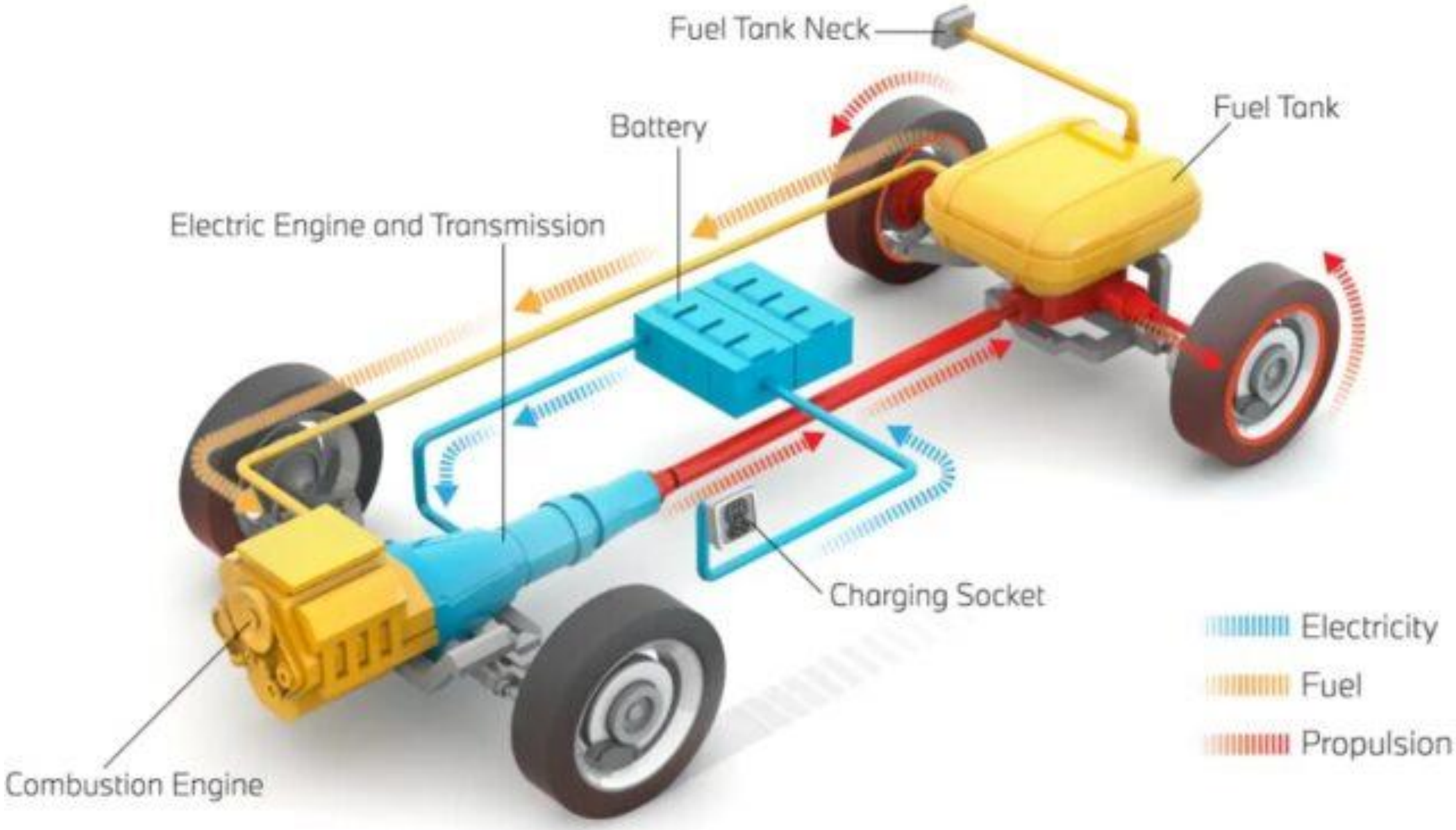
The battery replenishes itself via energy generated by the ICE as well as regenerative braking.


Fuel Tank
Fuel Tank Neck
Battery
Transmission
Electricity
Fuel
Propulsion
Combustion Engine
Electric Engine

PHEV

Plug-in Hybrid Electric Vehicle, this type of EV is powered by both gasoline and electricity. PHEVs, as the name suggests, may be plugged into an outlet or charging station to recharge the on-board battery.

In addition, it usually possesses the ability to run solely on battery power alone, as well as just gas or a combination of both.

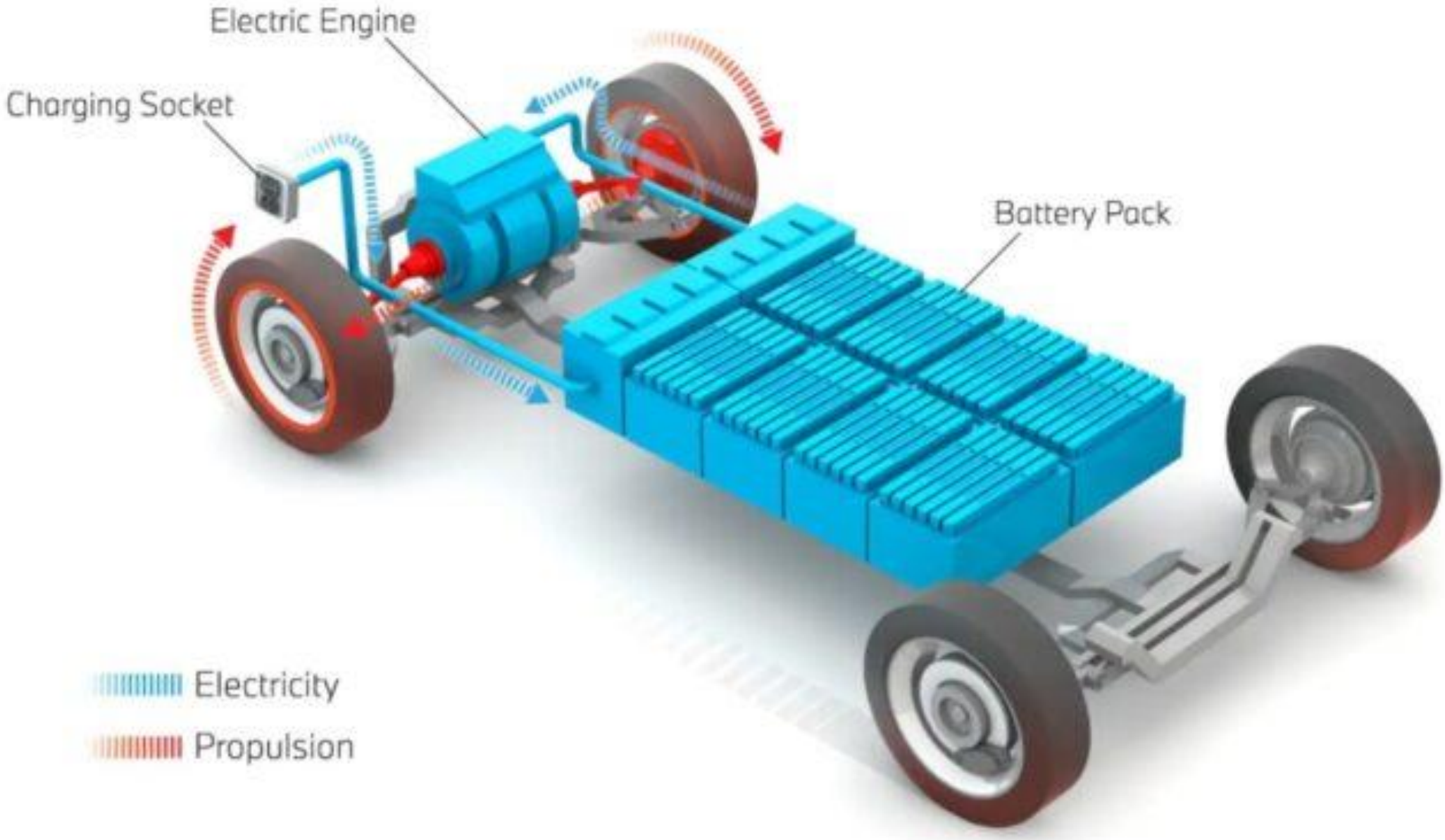

Fuel Tank Neck
Fuel Tank
Battery
Electric Engine and Transmission
Charging Socket
Combustion Engine
Electricity
Fuel
Propulsion

BEV

Battery Electric Vehicles do not have an ICE, fuel tank or exhaust pipe and rely only on electricity for propulsion.

Charging involves connecting to a standard 120-volt outlet Level 1, 240-volt household/public Level 2 or a Level 3 direct DC power source.

Premium offerings boast increased range due to larger and higher capacity battery packs using 400 & 800 volts.

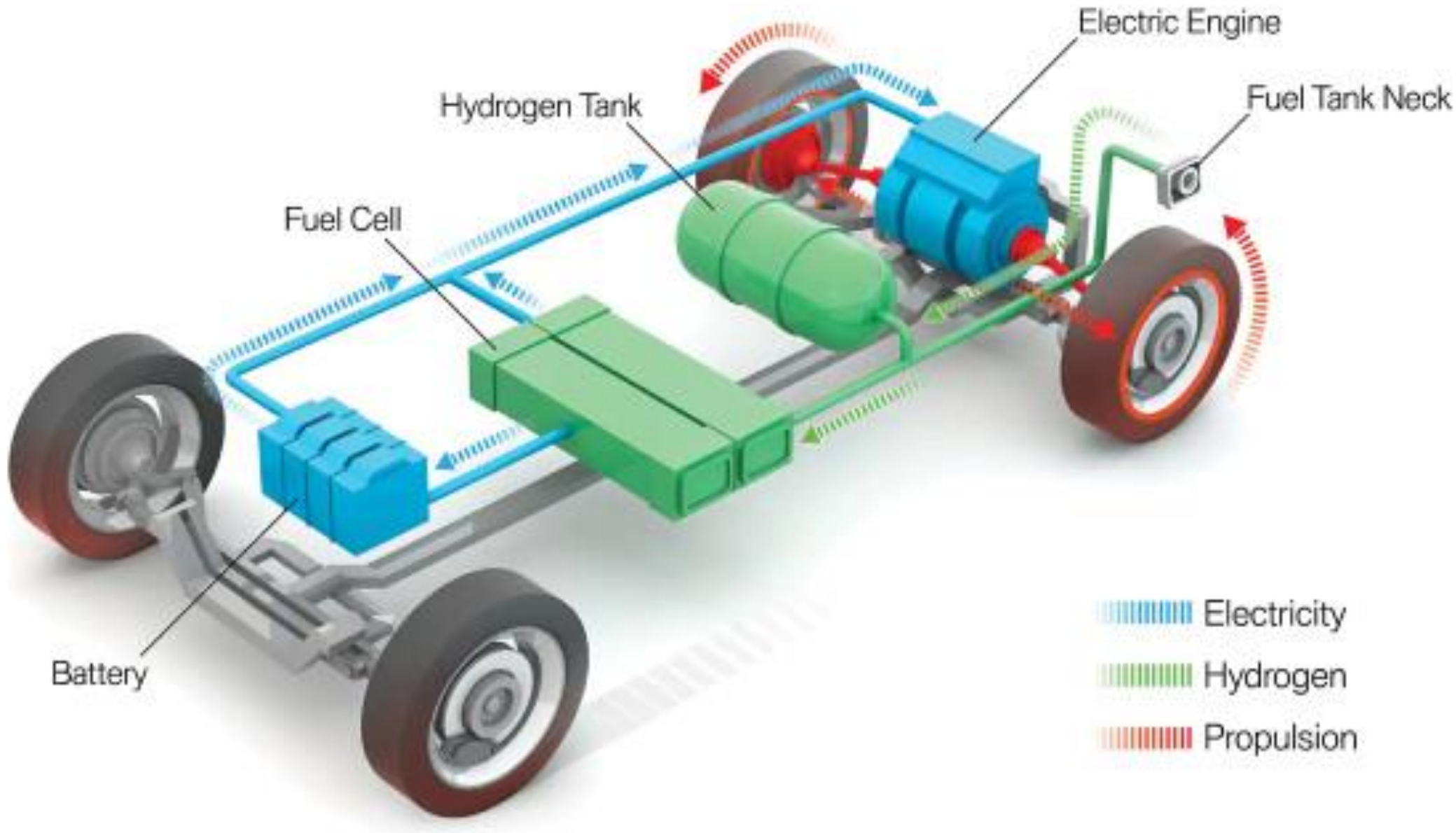

Electric Engine
Charging Socket
Battery Pack
Electricity
Propulsion

FCEV

Fuel Cell Electric Vehicles run on compressed liquid hydrogen. Hydrogen is combined with air inside the fuel cell stack, the reaction powers the electric drive motor.

Similar to a BEV they are quiet, produce no emissions but the tank can be refilled in a few mere minutes.

The trick is finding a station — currently very few retail facilities exist.

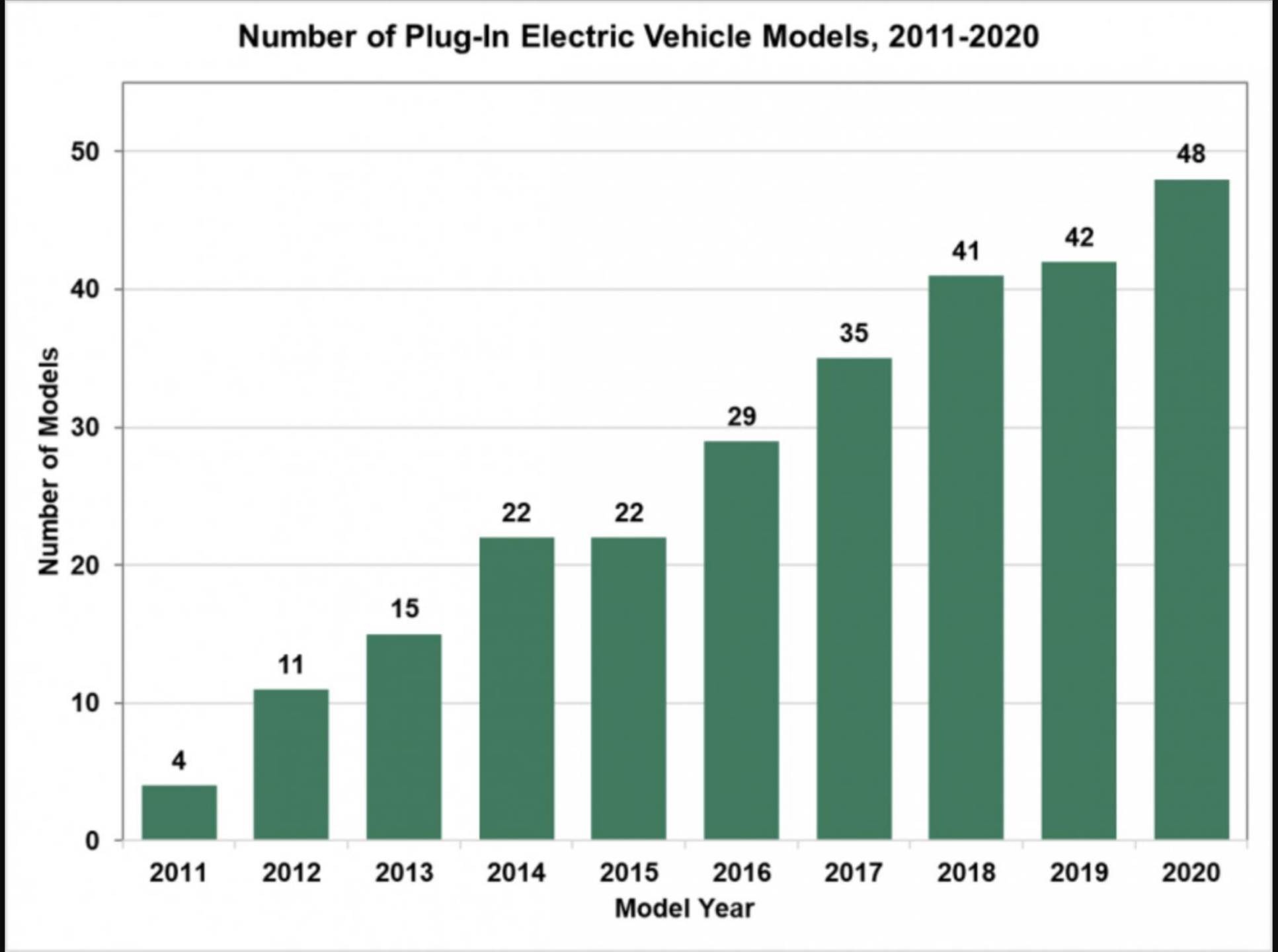

Electric Engine
Hydrogen Tank
Fuel Tank Neck
Fuel Cell
Battery
Electricity
Hydrogen
Propulsion

Is the ICE melting?

Over 85 new Electric/Hybrid models arriving soon!!

1914 Detroit Electric Model 47 Brougham.

Personal Car of Clara Ford.


Number of Plug-In Electric Vehicle Models, 2011-2020
Number of Models
0
10
20
30
40
50
4
11
15
22
22
29
35
41
42
48
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Model Year

35 BEV's in or near production

2021 Mach-E

2021 Kia Niro EV

2022 Audi Q4 E-Tron

2022 Mercedes EQ

2022 Tesla Cybertruck

2021 Chevy Bolt

2021 Ford F-150

2022 Mazda MX-30

2021 Audi E-Tron

2020 Mercedes EQC

2021 Tesla Model 3

2022 Chevy Bolt

2022 Hyundai Ioniq 5

2022 Nissan Ariya

2022 BMW iX

2021 Polestar 2

2021 Tesla Model S

2022 Chevy Bolt EU

2021 Hyundai Kona EV

2021 Nissan Leaf

2021 BMW i3

2021 Porsche Taycan

2021 Tesla Model X

2022 Hummer EV

2021 Hyundai Nexo

2021 Volkswagen ID4

2021 Jaguar I-Pace

2021 Rivian R1S

2021 Tesla Model Y

2023 Cadillac Lyriq

2022 Kia EV6

2022 Audi E-Tron GT

2021 Lucid Air

2021 Rivian R1T

2020 Tesla Roadster

More than 35 car companies are developing EV products

Motor Trend Magazine, May 2021

https://www.motortrend.com/features-collections/electric-car-companies-make-electric-cars/

Autoweek eMail Newsletter ‘State of Charge”

https://www.autoweek.com/ev/?source=nl&utm_source=nl_aut&utm_medium=email&date=051421&utm_campaign=nl23846638&utm_content=B&utm_term=AUT_Autoweek_StateOfCharge_DailyDrive_Newsletter_Sending

BMW

Although its initial EVs were either compliance cars (i3, Mini EV) or wacky science projects (i8), BMW is now serious about electrification. Coming are the i4 fastback and 2022 BMW iX midsize crossover EVs, as the automaker wants electrified vehicles to account for a quarter of its U.S. sales by 2025 and half of global sales by 2030.

BMW i4

Daimler/ Mercedes-Benz

Mercedes created the EQ subbrand solely for electric vehicles, with global launches of the EQS sedan, EQA and EQB small crossovers, and EQE midsize sedan coming this year. These are among 10 new electrified models from Mercedes in 2021, including a slew of hybrids. The U.S. will not get every new EQ model, and Mercedes has not set an expiration date for its combustion engines yet.

Ford

Ford is doubling its investment in electric vehicles to $22 billion by the end of 2025. All its passenger vehicles will offer some form of electrification by mid-2026, and two-thirds of its commercial vehicles will be electric by 2030. An electric F-150 pickup, available in mid-2022, follows the 2021 Ford Mustang Mach-E. In Europe, Ford will phase out gas-powered cars by 2030 and use VW's MEB electric vehicle platform to bring new EVs to market from retooled Ford plants starting in 2023.

General Motors

GM announced plans to spend $27 billion over five years and introduce 30 electrified vehicles globally by 2025. The automaker hopes to stop selling vehicles with gas or diesel engines by 2035. In addition to the Chevrolet Bolt and 2022 Bolt EUV SUV, the portfolio will include a 2022 GMC Hummer EV full-size pickup truck and its SUV sibling, an electric Chevy pickup, and crossovers for all four GM brands.

Cadillac Lyriq

Jaguar Land Rover

Jaguar has pledged to sell only EVs starting in 2025; all future models will be built exclusively on an electric vehicle architecture, with most rolling out of the Solihull plant. That is a big leap from just the I-Pace crossover, but that's what spending $3.5 billion a year on R&D gets you. Land Rover will get six new electrified vehicles over the next five years. The first fully battery-powered Land Rover is due in 2024, with that brand's lineup going fully electric by 2039.

Page image provided by *Motor Trend Magazine, June 2021*

Kia

Kia's lineup alone calls for 11 electrified models by 2026, including seven dedicated EVs on the E-GMP architecture. The goal is to sell 1.6 million electrified vehicles (880,000 pure electric) a year by 2030, accounting for 40 percent of its total sales. The first dedicated EV, the EV6, launches later this year to join the Niro EV already on sale.

Kia HabaNiro concept

Honda

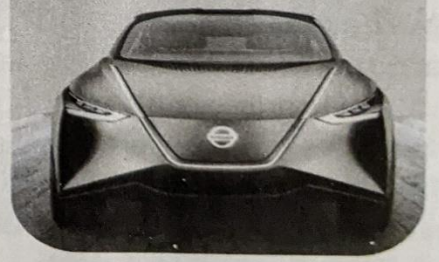
Honda needs to play catch-up, and new CEO Toshihiro Mibe will accelerate the company's move to EVs, including its partnership with GM that will birth a crossover for Honda and an undetermined EV for Acura. Honda wants two-thirds of its sales to be battery electric or hybrid vehicles by 2030.

Hyundai

Hyundai wants to sell 1 million EVs a year globally by 2025 between the Hyundai, Kia, Genesis, and newly established EV-only Ioniq brands, using the Electric-Global Modular Platform (E-GMP). The arrival of 23 electrified models starts with the stylish Ioniq 5 midsize electric SUV, which offers a 298-mile range and arrives in the U.S. this summer. The Ioniq 6 electric sedan and Ioniq 7 large crossover will follow. Hyundai entered talks with Apple about assembling vehicles that would see the tech giant enter the EV market, but no deal had been inked at press time.

Nissan

All new vehicles in key markets will be electrified by the early 2030s with a goal of carbon neutrality by 2050. Nissan is working on solid-state batteries for pure EVs while also working to improve its e-Power hybrid technology. The Leaf company is adding the Ariya compact electric SUV this year; there are plans for eight EVs by the end of the year in overseas markets, with a goal of 1 million annual EV sales eventually.



Nissan IMx KURO concept

Stellantis (formerly FCA)

FCA merged with PSA Group in January to create Stellantis, a company with 14 brands that currently sell 29 electrified vehicles globally. New CEO Carlos Tavares said every new vehicle launched until 2025 will have an electrified variant, starting with 10 new entries this year. Many are plug-ins, such as the Chrysler Pacifica PHEV, the Jeep Wrangler 4xe, and forthcoming variants of the Jeep Grand Cherokee, Wagoneer, and Compass. By 2025, Stellantis will have one EV version of every newly launched global model.

Subaru

Subaru has stated it wants an electric or hybrid version of every vehicle in its lineup, but details aren't much firmer than that. The Crosstrek Hybrid is the only electrified model for sale in the United States.

Subaru Crosstrek Hybrid

Tesla

Tesla's 79 percent EV market share is under siege, but CEO Elon Musk and his firm are still poised for growth. The Model S, X, 3, and Y soon will be augmented by the wild, stainless steel Cybertruck. A high-end Roadster a $25,000 model, and even a semi truck are still promised.

Tesla Model 3

Toyota

Between now and 2025, Toyota will use the e-TNGA platform to launch an electric subcompact crossover, a compact sedan, a people hauler, and a midsize SUV. The automaker will continue to offer myriad hybrids and plug-in hybrids, believing they are as beneficial to the environment as BEVs for some customers, depending on region and use.

Toyota RAV4 Prime

Volkswagen

The Volkswagen Group's EV push is the largest among mainstream automakers, with the company investing about $42 billion over the next five years to remove the stain of Dieselgate and reform itself as an electrified car company. The group expects to launch 70 all-electric models across all its brands by 2030, among them the recently introduced ID4, as well as about 60 hybrid variants. Its ambitious targets include building 26 million EVs and hybrids this decade.

Volvo and Polestar

Volvo was one of the first brands to commit to an EV future, announcing in 2017 that all new models from 2019 on would be either fully electric or hybridized. The target is to sell 1 million such vehicles by the end of 2021, with offerings to come from Volvo and its adjacent Polestar EV brand. Today, Volvo is on track to shift half of its sales to fully electric vehicles by 2025; CEO Håkan Samuelsson wants Volvo to be electric-only by 2030.

Page image provided by *Motor Trend Magazine, June 2021*

Apple

The prospect of an electric car from Apple is a tasty idea that has resurfaced periodically since 2015. Such a car has the potential to truly disrupt the industry. The latest intel surrounds recent talks with Hyundai and Kia to help develop and potentially manufacture an electric autonomous vehicle, but those discussions have yet to result in a deal. Apple has, over the years, approached other automakers and has explored going it alone, but it seems to be more comfortable developing software that can be installed in a vehicle another automaker builds.

China, the Country

There are literally dozens of Chinese electric vehicle manufacturers, including Nio, Byton, Xpeng, and Geely, though how many will enter the U.S. market remains to be seen.

Byton K-Byte

Lordstown

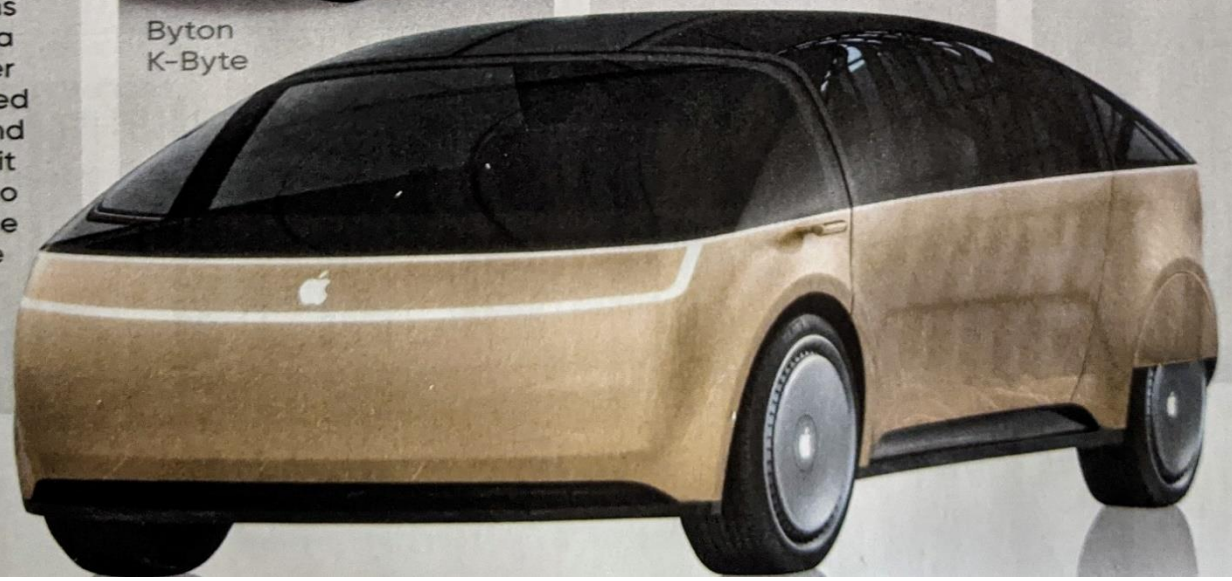
Until recently, Lordstown looked like another compelling startup. It bought a shuttered GM plant and claimed about 100,000 electric work trucks were presold to commercial customers. At press time, reports suggest Lordstown misrepresented its order book, which the company has denied.

Lucid

The Lucid Air is an impressive first offering from this electric vehicle startup, and an SUV variant is planned for 2023. Lucid claims a mind-blowing range of more than 500 miles on a single charge, which could be a game-changer for consumers—and the industry.

Rivian

Production of the R1T electric pickup, the R1S three-row SUV, and delivery vans for Amazon starts this year, with more models still to come. Despite piles of funding and promising products, Rivian remains a startup, with all the challenges that entails.

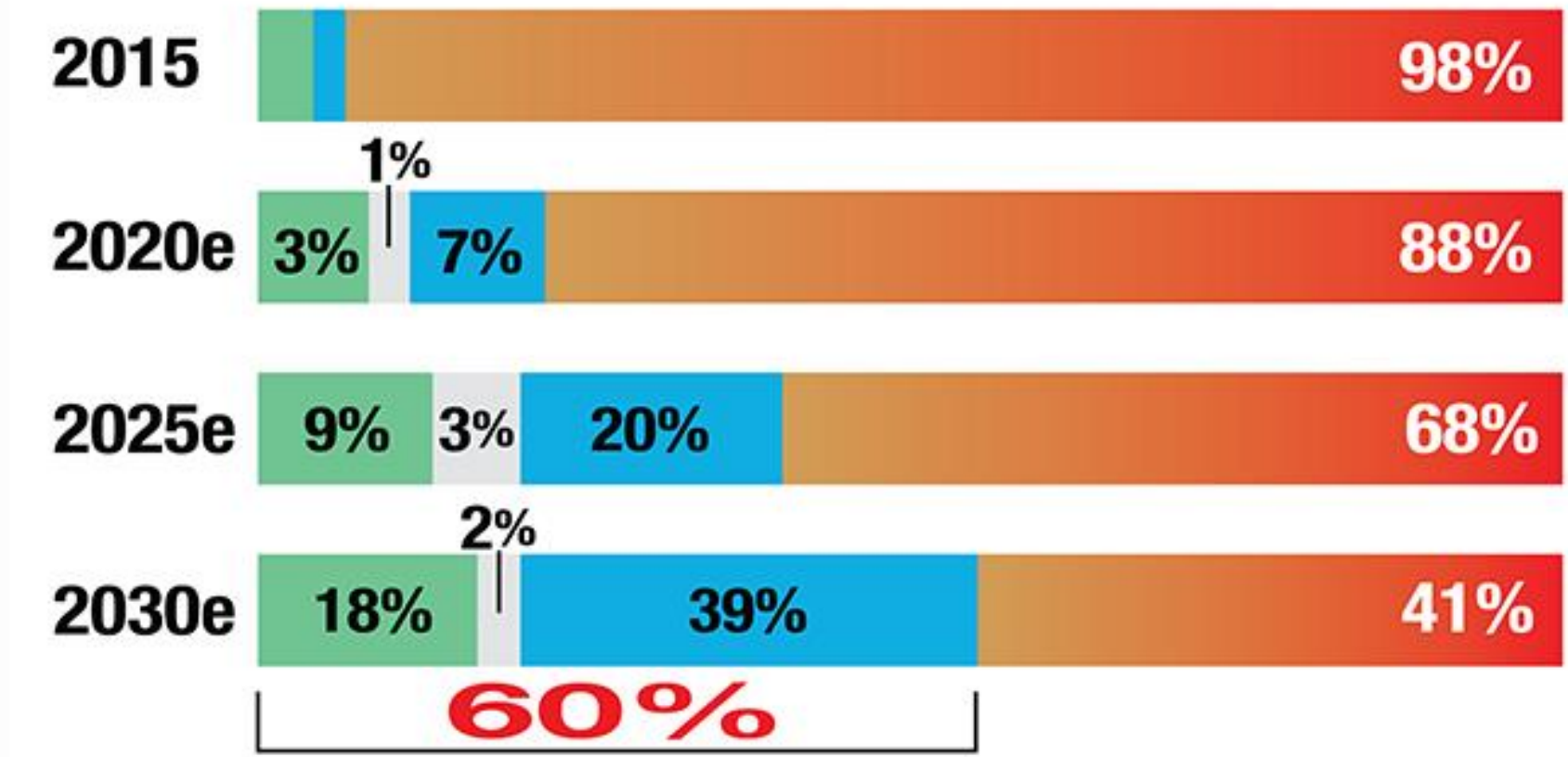


Hypothetical Apple Car

Rivian R1S

Page image provided by *Motor Trend Magazine, June 2021*

By 2030 (in 11 yrs) EVs and Hybrids will account for 60% of all global vehicle sales



Source: JP MORGAN ESTIMATES

BEV
BATTERY ELECTRIC VEHICLE

PHEV
PLUG-IN HYBRID ELECTRIC VEHICLE

HYBRID
GAS & ELECTRIC VEHICLE

ICE
INTERNAL COMBUSTION ENGINE (GAS)

That’s All Folks