Hybrid Car Technology

TCPC General Meeting - May 2020

What’s going to happen

- History and Terminology - Jack
- Hybrid Technology by Maker - Curt and Jack
- New technologies that make driving safer - Curt and Bill

Timeline of Electric Vehicle History

This timeline is derived from https://www.energy.gov/timeline/timeline-history-electric-car

1889 - First electric vehicle created by William Morrison in Des Moines, Iowa. Not much more than a motorized cart.

1899 - Electric vehicles gain popularity. The electric car is clean and quiet. It has a range of 70-100 miles.

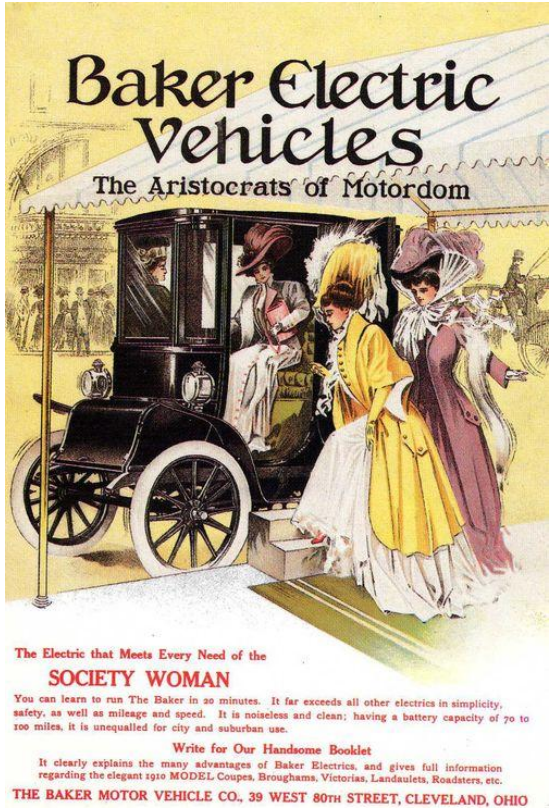
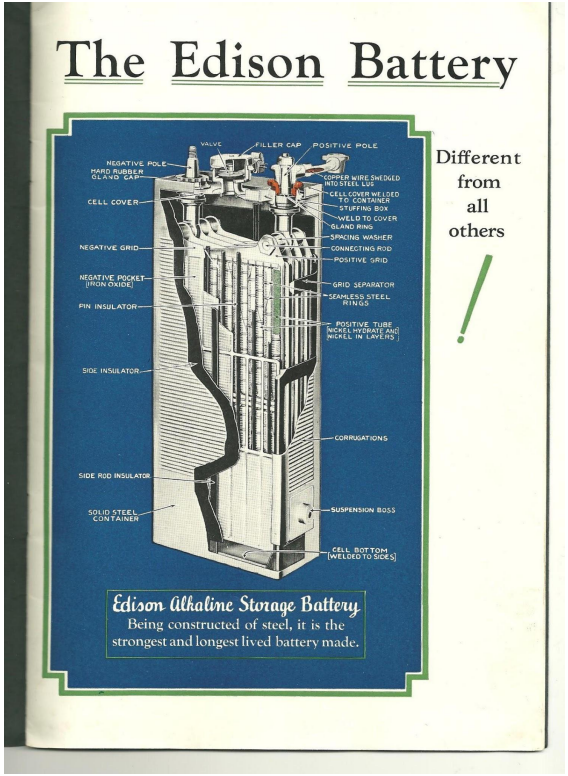


Photo courtesy of the National Museum of American History.

1900-1912 The heydey of Electric Vehicles



Electrics account for almost ⅓ of all vehicles on the road.

1901 - Edison tackles the need to make a “better battery” for electric vehicles.

1901 - Ferdinand Porsche creates the Mixte, the first hybrid vehicle.

1912 - The Model T gets an electric starter which kills off the electric vehicle market

Later Developments

1973 - Gas shortages renew interest in electric vehicles for a short period of time

1997 - Toyota introduces the Prius hybrid. Starts selling worldwide in 2000.

2006 - Tesla announces first roadster

2010 - Chevy Volt is first widely available plug-in hybrid electric. Nissan introduces all electric LEAF.

Acronym Review

HEV - Hybrid Electric Vehicle

PHEV - Plug-in Hybrid Electric Vehicle

BEV - Battery Electric Vehicle (also known simply as EV)

FCEV -Fuel Cell Electric Vehicle

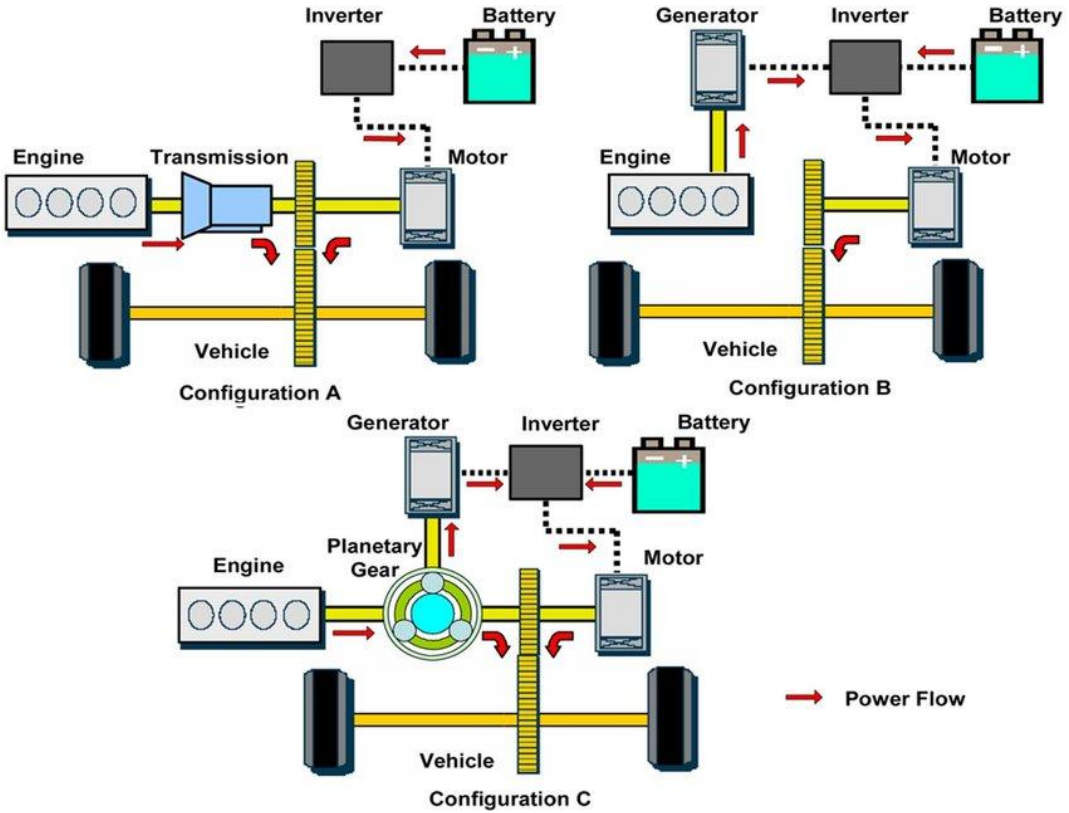
ICE - Internal Combustion Engine

Series vs Parallel Hybrid

Series Hybrid: The ICE (gas, diesel, biofuel, etc) powers a generator. All motive power from electric motors. ICE tuned to most efficient RPM

Parallel Hybrid: Both the ICE and the electric motor can drive the wheels directly. In most cases they can work separately or together.

Most current vehicles are a combination of both.



https://www.researchgate.net/profile/Huei_Peng/publication/224309401/figure/fig3/AS:667683058110471@1536199454658/Hybrid-vehicle-configurations-A-parallel-B-series-and-C-power-split.jpg

Hybrid Technology by Brand

Toyota

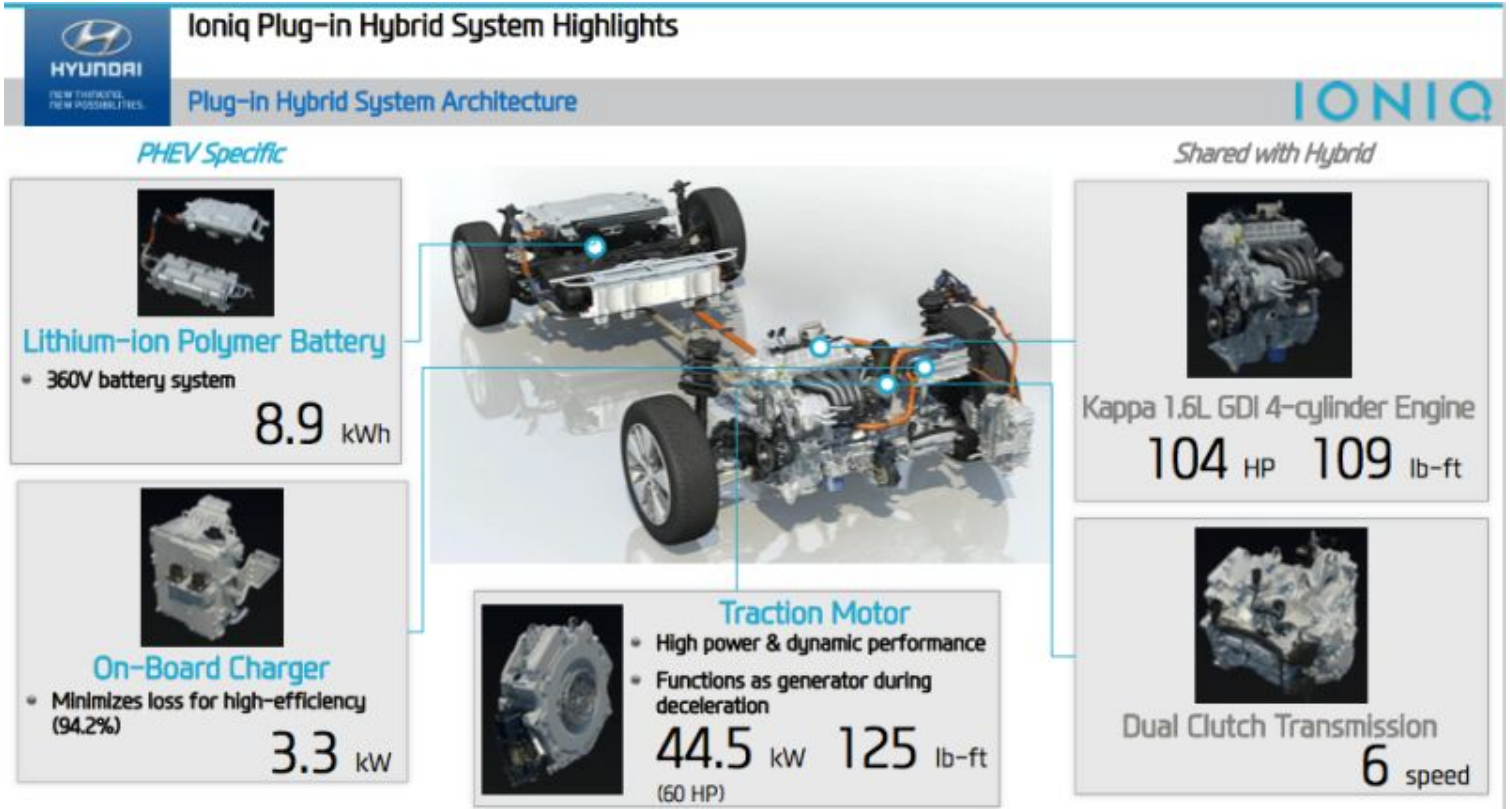
Hyundai/Kia

Honda

Curt will handle Toyota (and Ford)
Jack will handle Hyundai and Honda

Hyundai/Kia - Hyundai IONIQ “Blue” Drivetrain

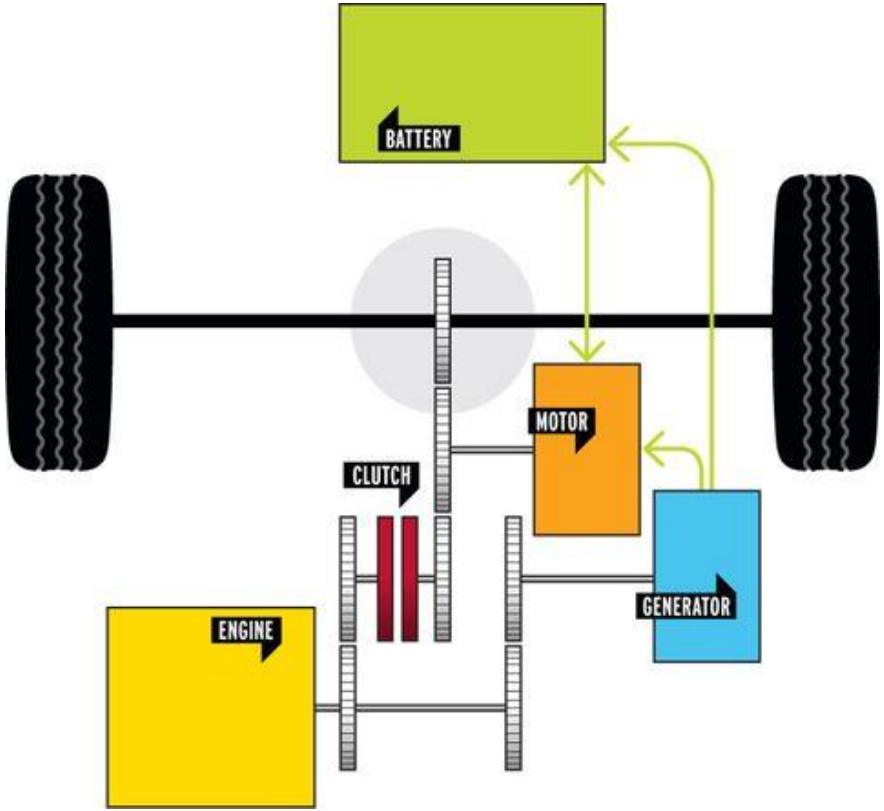
- TMED - Transmission-Mounted Electric Device
- Electric motor inline between ICE and 6-speed automatic Transmission



https://www.greencarcongress.com/2017/02/20170216-ioniq-1.html

Honda: Would you drive a car with no Transmission?

- Honda’s Hybrid drivetrain features an extra electric “motor” that serves as a generator.
- At low speeds it works as a series hybrid. One motor to drive the wheels one is just a generator.
- At highway speeds a direct drive clutch engages and the ICE drives the wheels.



https://static-resources.imageservice.cloud/293931/explaining-the-honda-accords-shrewdly-designed-new-hybrid-system.jpg

Automation technologies - Toward driverless cars

A discussion of new features, not limited to Hybrid and Electric vehicles, that make driving safer and are in many cases part of the research into driverless vehicles.