

Co-Evolution of Vehicles & Fuels

FUELS evolving toward domestic, low- no-CO₂ options

We are here. (96% reliant on OIL)

Gasoline
Diesel

Conventional ICE vehicles

"ICE" = Internal Combustion Engine

1901

Gasoline & Diesel
(176,000 gas stations)

Corn Ethanol (E85)
(100s of U.S. stations)

Soy Biodiesel
(100s of U.S. stations)

Hydrogen (~ 100 stations worldwide)

Flex-fuel ICE vehicles
(E-85 & gasoline)

Hybrid-ICE vehicles
(e.g., Toyota Prius)

Cleaner diesel ICE vehicles

1993-1997-2009

Gasoline & Diesel

Hydrogen

Grid Electricity

Biofuels from cellulose & other renewable sources

Fuels from coal w/CO₂ capture & sequestration

Plug-in hybrid ICE flex-fuel vehicles

Battery can be recharged by the electric grid, extending the vehicle's electric-only range.

Hybrid Fuel Cell vehicles

2010

Hydrogen

Low- no-CO₂ Grid Electricity

Biofuels from cellulose & other renewable sources

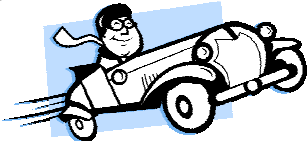
Fuels from coal w/CO₂ capture & sequestration

Plug-in Hybrid Fuel Cell vehicles

2020 & beyond

Little/no OIL in transportation by 2050

VEHICLES evolving toward hybrids = less oil, air pollution and greenhouse gases



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