

# Co-Evolution of Vehicles & Fuels

FUELS evolving toward domestic, low- no-CO<sub>2</sub> options

We are here. (96% reliant on OIL)

**Gasoline**  
**Diesel**

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**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)

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

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

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**Cleaner diesel ICE vehicles**

1993-1997-2009

**Gasoline & Diesel**

**Hydrogen**

**Grid Electricity**

**Biofuels from cellulose & other renewable sources**

**Fuels from coal w/CO<sub>2</sub> capture & sequestration**

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**Plug-in hybrid ICE flex-fuel vehicles**

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

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**Hybrid Fuel Cell vehicles**

2010

**Hydrogen**

**Low- no-CO<sub>2</sub> Grid Electricity**

**Biofuels from cellulose & other renewable sources**

**Fuels from coal w/CO<sub>2</sub> capture & sequestration**

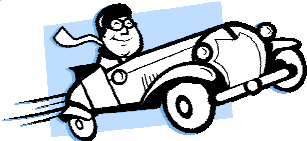
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**Plug-in Hybrid Fuel Cell vehicles**

2020 & beyond

Little/no OIL in transportation by 2050

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



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