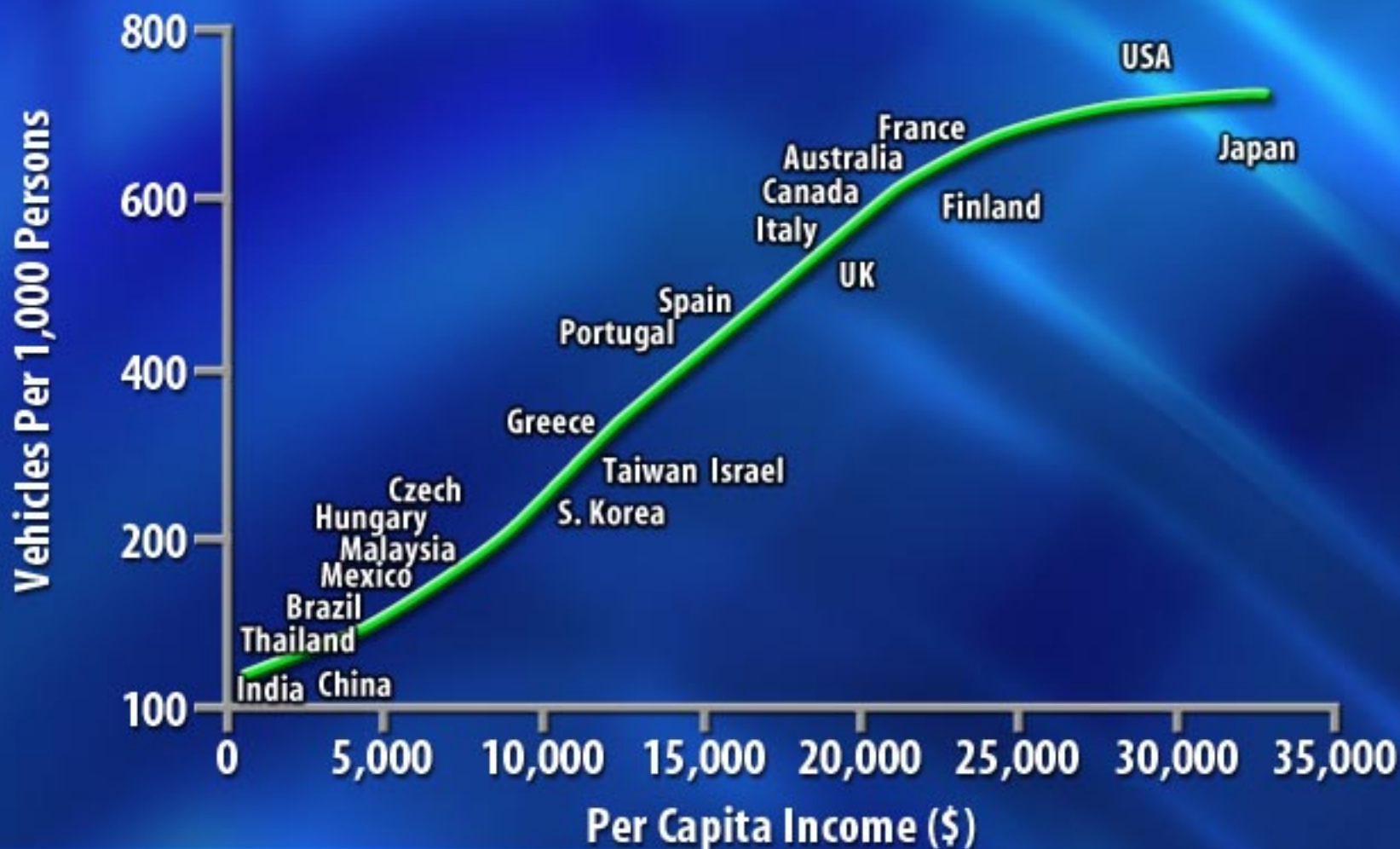


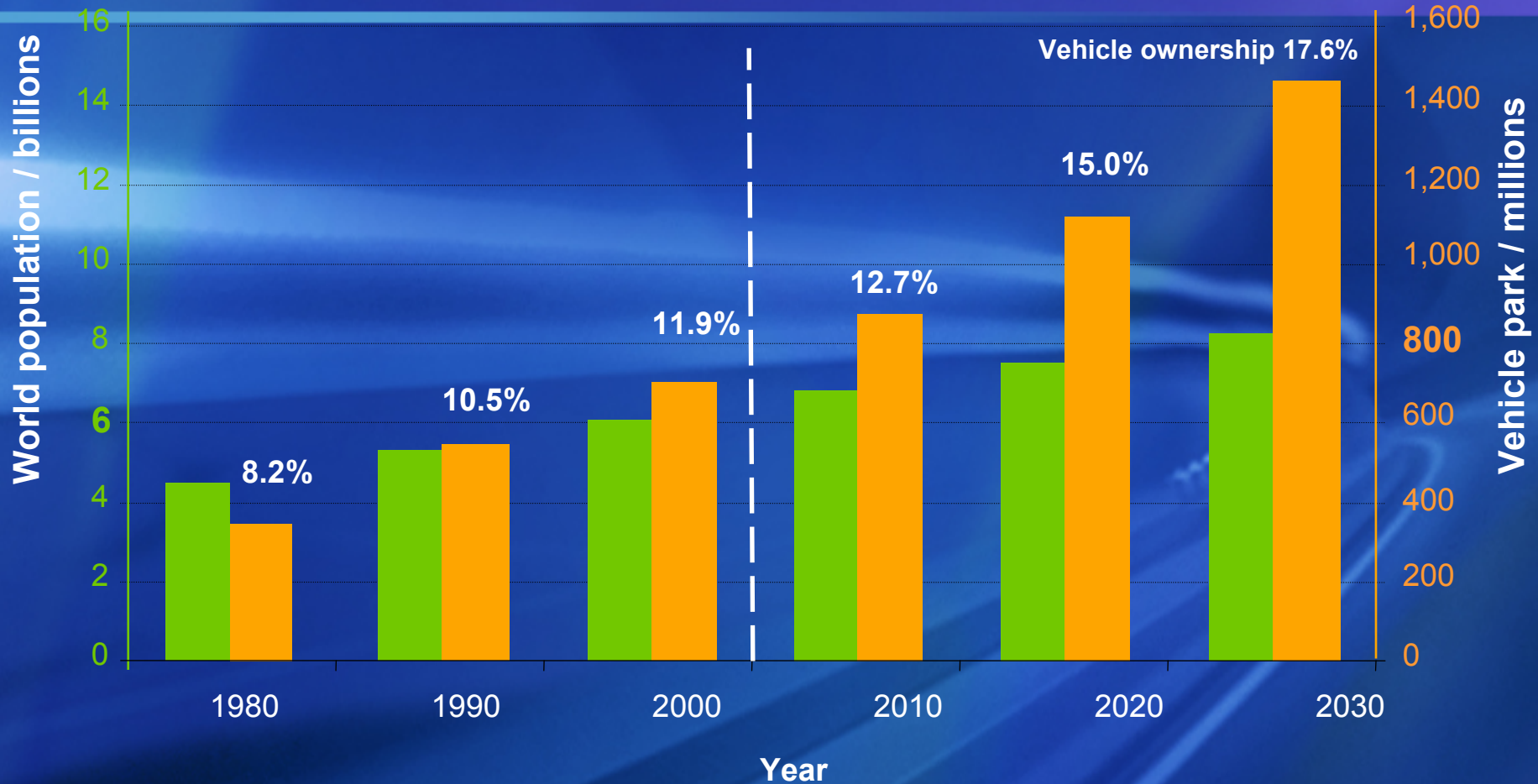


***Utilities' Role in the
Hydrogen Economy
Automotive Perspective***

RELATIONSHIP OF VEHICLE SALES TO PER CAPITA INCOME

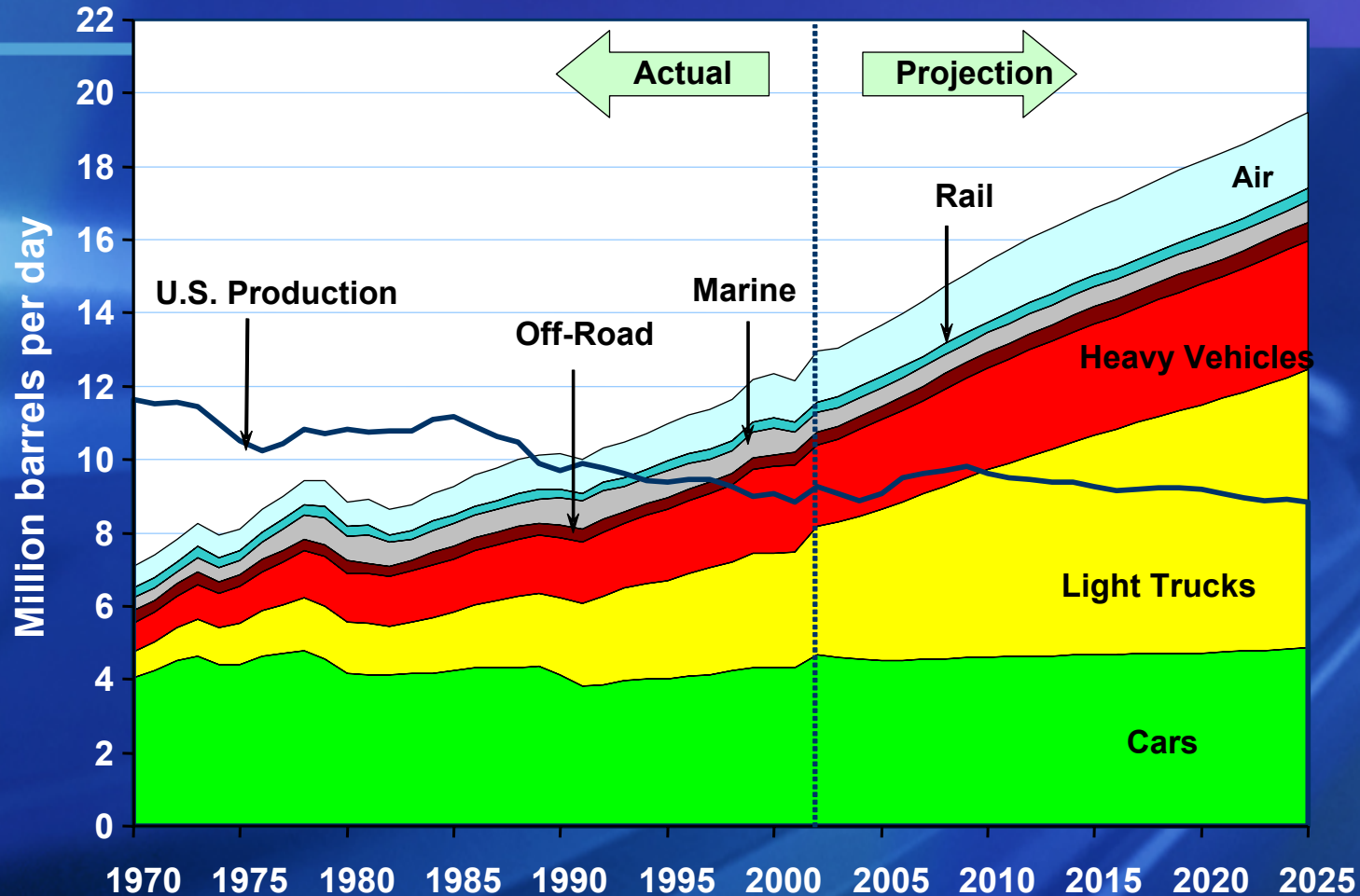


World Population and Vehicle Park



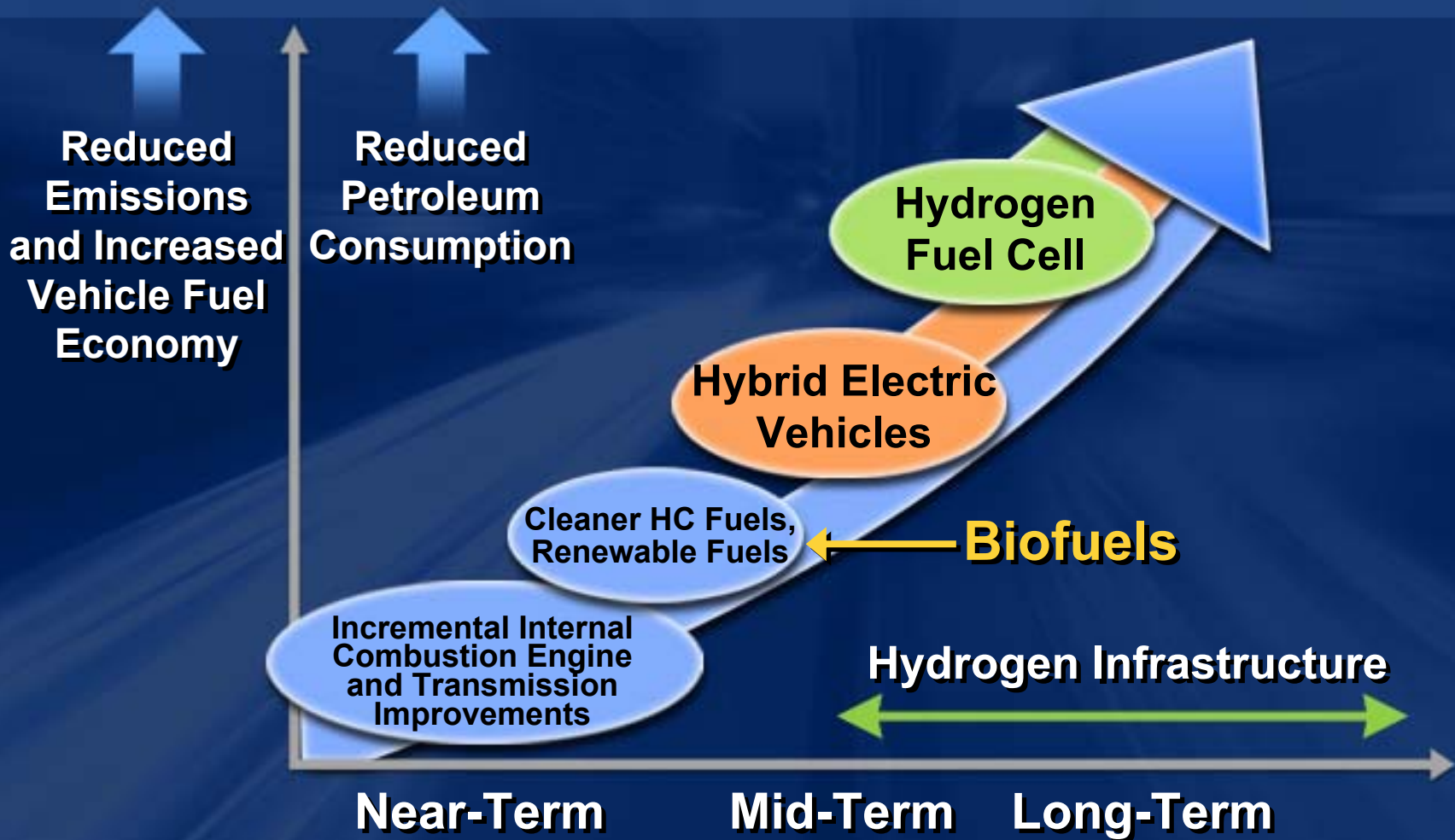
1.1 Billion vehicles by 2020 / 1.9 Billion by 2050

U.S. Oil Use for Transportation



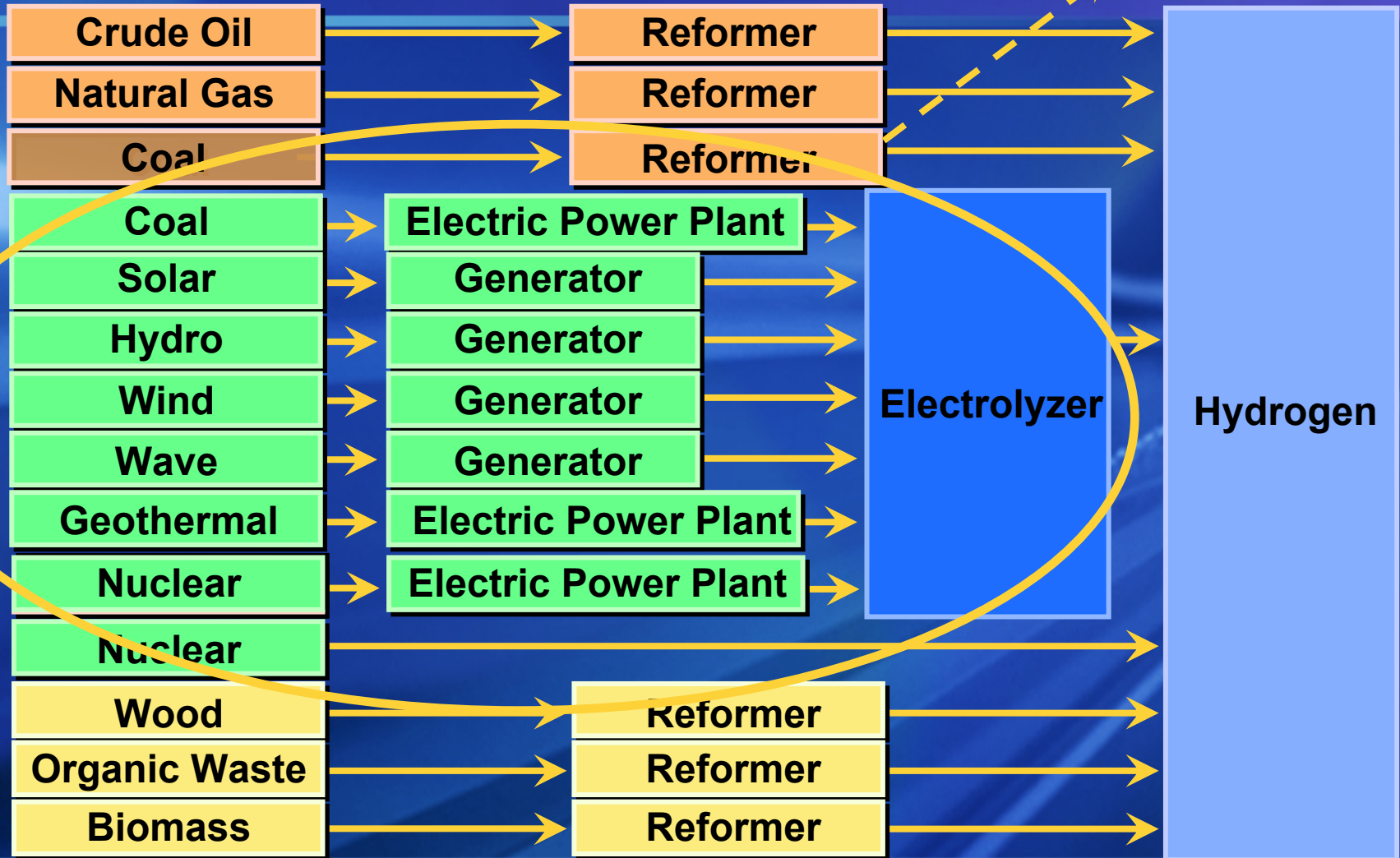
- The U.S. imports 55% of its oil; will grow to 68% by 2025 under the status quo.
- Transportation accounts for 2/3 of the 20 million barrels consumed each day.
- Source: US DOE, EIA

Advanced Technology Strategy



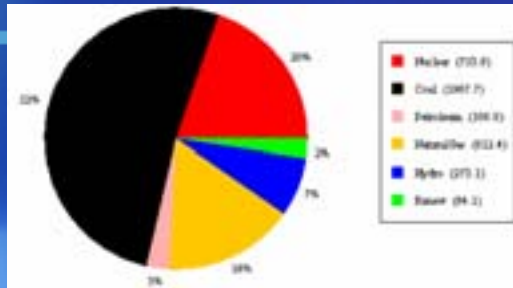
Hydrogen Pathways

Sequestration

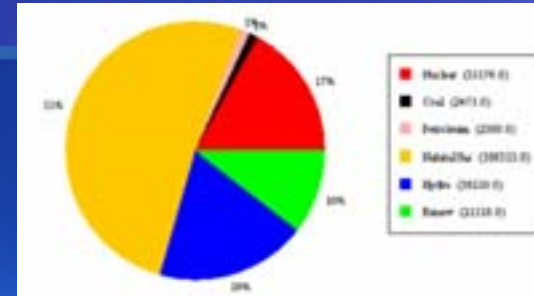


Diversity in sources of electric energy...

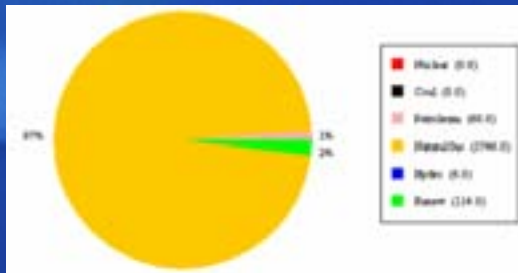
U.S. Average



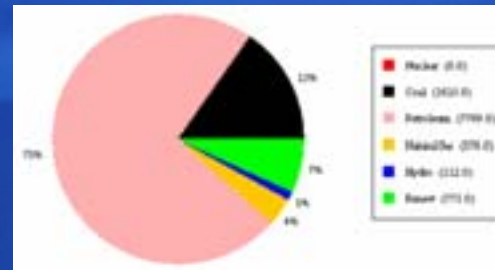
California



Rhode Island



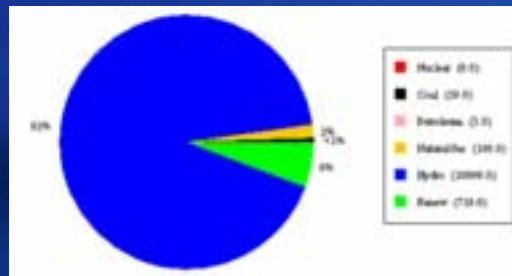
Hawaii



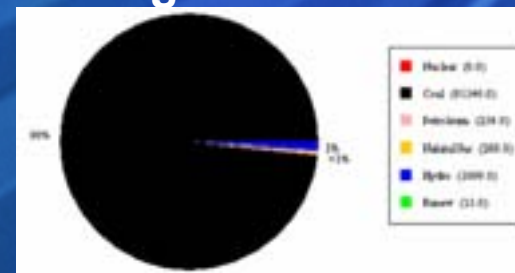
Vermont



Idaho



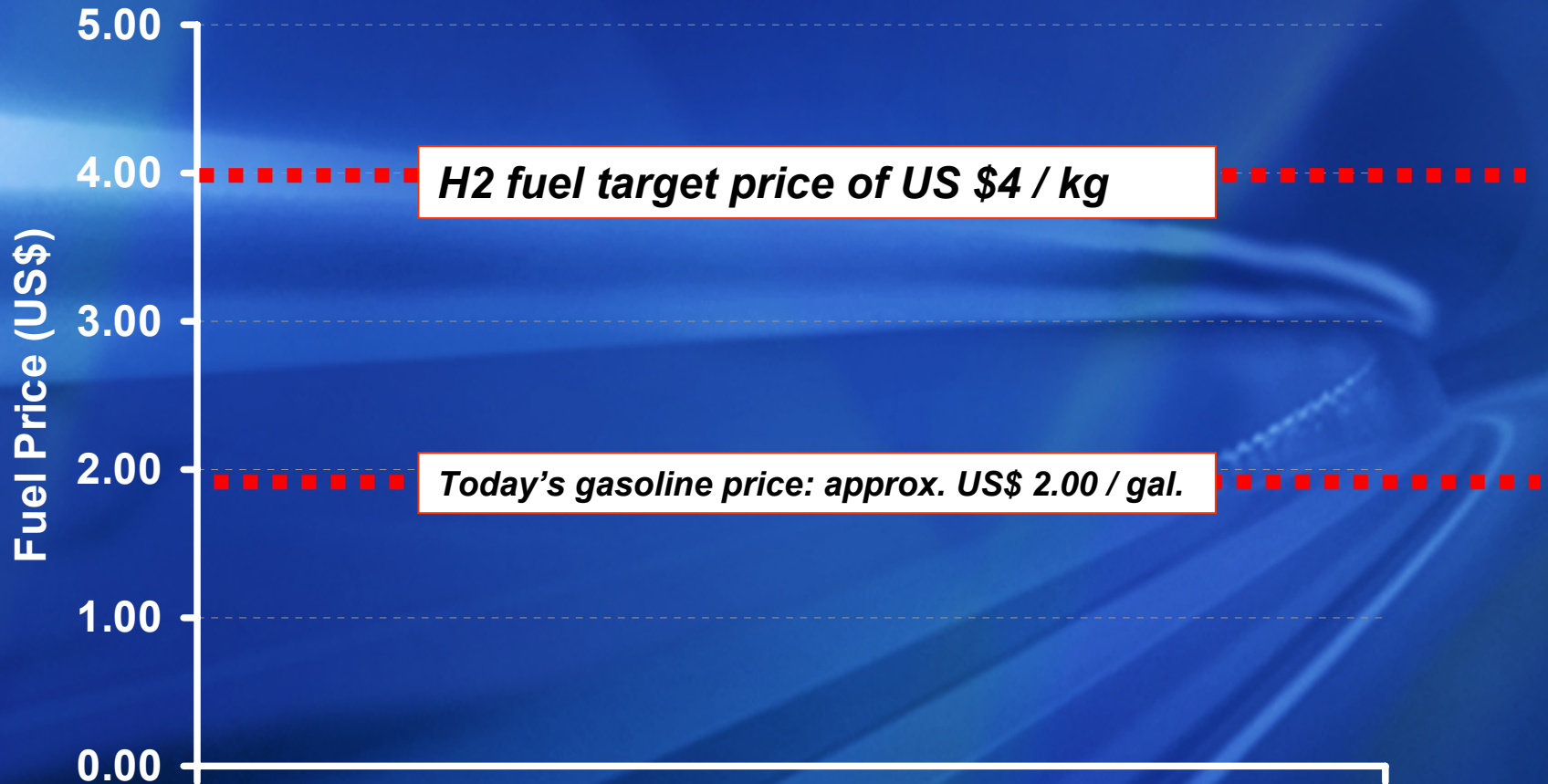
West Virginia



Coal
 Nuclear
 Natural Gas
 Hydro
 Petroleum
 Renew

... many "local" sources support the production of clean Hydrogen

What Should Hydrogen Cost?

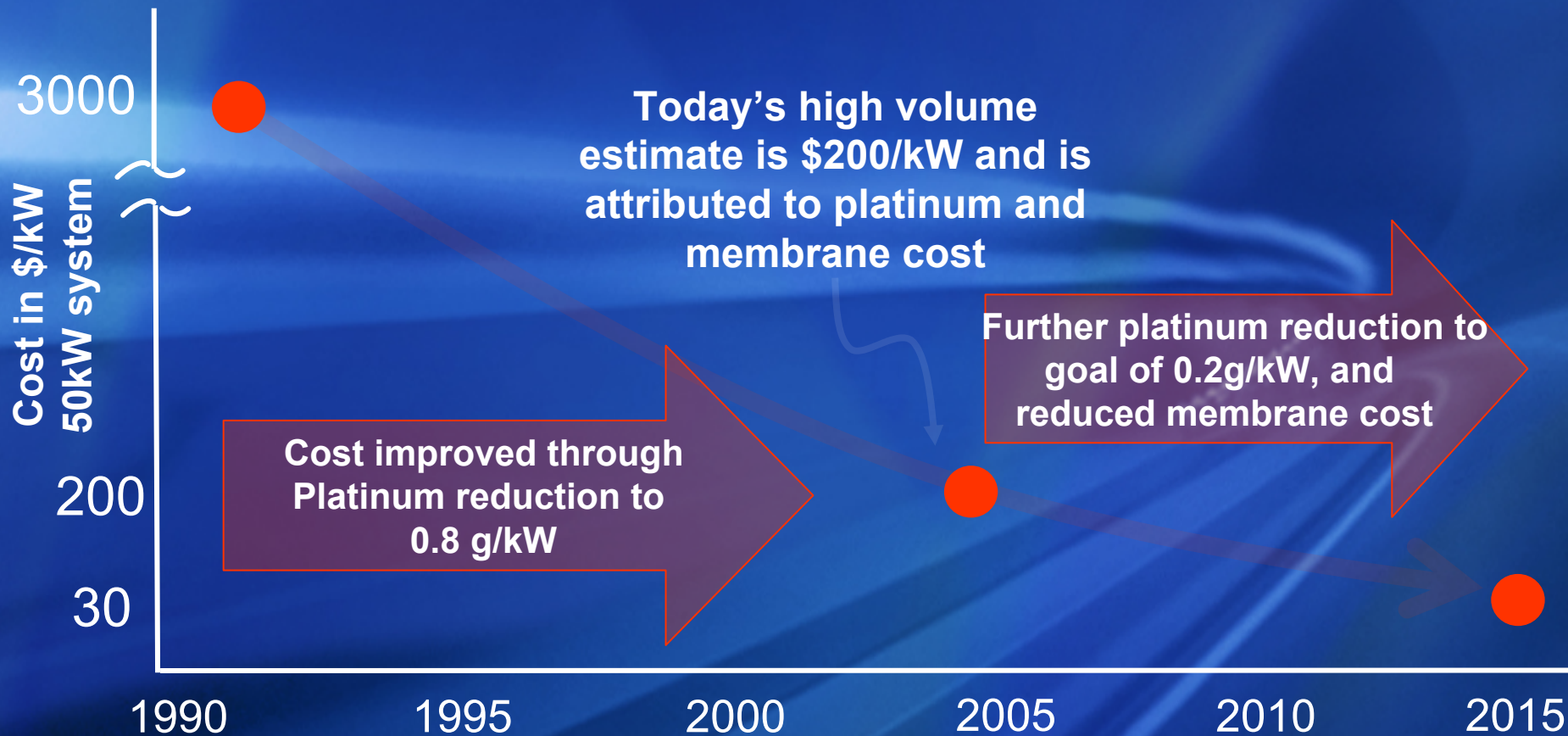


Note:

- 1 Gallon gasoline = 1 Kg H2 fuel on energy-equivalent basis
- H2 / Fuel Cell vehicle is 2X more efficient versus today's ICE vehicles

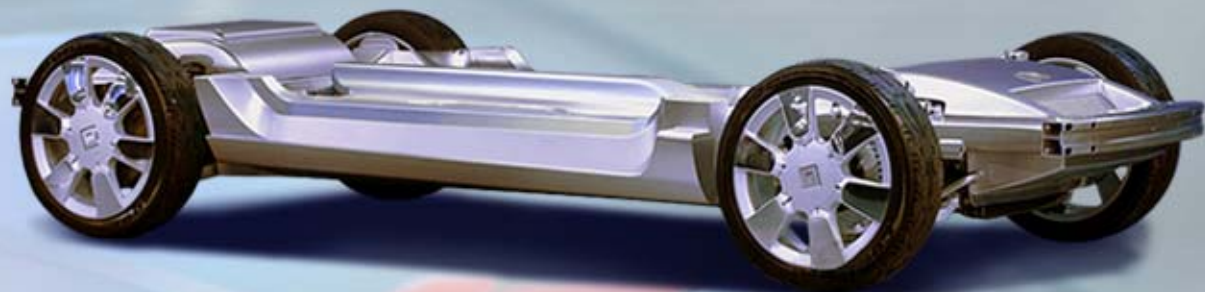
DOE Estimate of PEM Fuel Cell Cost:

6X gap between today's high volume cost and DOE's target



- High volume production defined as 500,000 units per year
- Cost estimated by TIAX with enhanced hydrogen storage

SEQUUEL



Infrastructure: **Small Chickens – Small Eggs**





Hydrogen Refueling Station

Home Refueling





Thank You