# Moving Towards A Cleaner Federal Fleet

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Motor Vehicle Roundtable - Federal Fleet Electrification
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PEW CENTER ON Global CLIMATE CHANGE

# Pew Center Overview

- Founded in May 1998
- Independent, non-profit, non-partisan
- Produces research on policy, economics, science & impacts, and solutions
- Works with policy makers at state, federal, and international levels
- Conducts education and outreach
- Engages the business community through the Business Environmental Leadership Council

# Oil and GHG Emissions are the Problem

Transportation uses 70 percent of oil consumed in the United States

27% of all GHGs in U.S. are from transportation

*Protesters chant anti-government slogans in a square in Benghazi city, Libya. (Reuters)*

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# Alternative Vehicles

## Barriers to success today and competition in 2035

# Vehicle Alphabet Soup

| Abbreviation | Drivetrain | Fuel | Market Barriers | Range (miles) | Example Vehicle |
|---|---|---|---|---|---|
| Conventional Vehicle | Internal combustion engine (ICE) | Petroleum | - | 300+ | Ford Fusion |
| HEV | Hybrid electric & ICE | Petroleum | Cost | 300+ | Toyota Prius |
| EV | Battery electric | Electricity | CICA, range | ~100 | Nissan Leaf |
| PHEV-XX | XX range battery electric w/ICE backup | Electricity, Petroleum | CICA | 300+ | Chevy Volt |
| FCV | Fuel cell electric | Hydrogen | CICA | ~300 | Honda FCX Clarity |

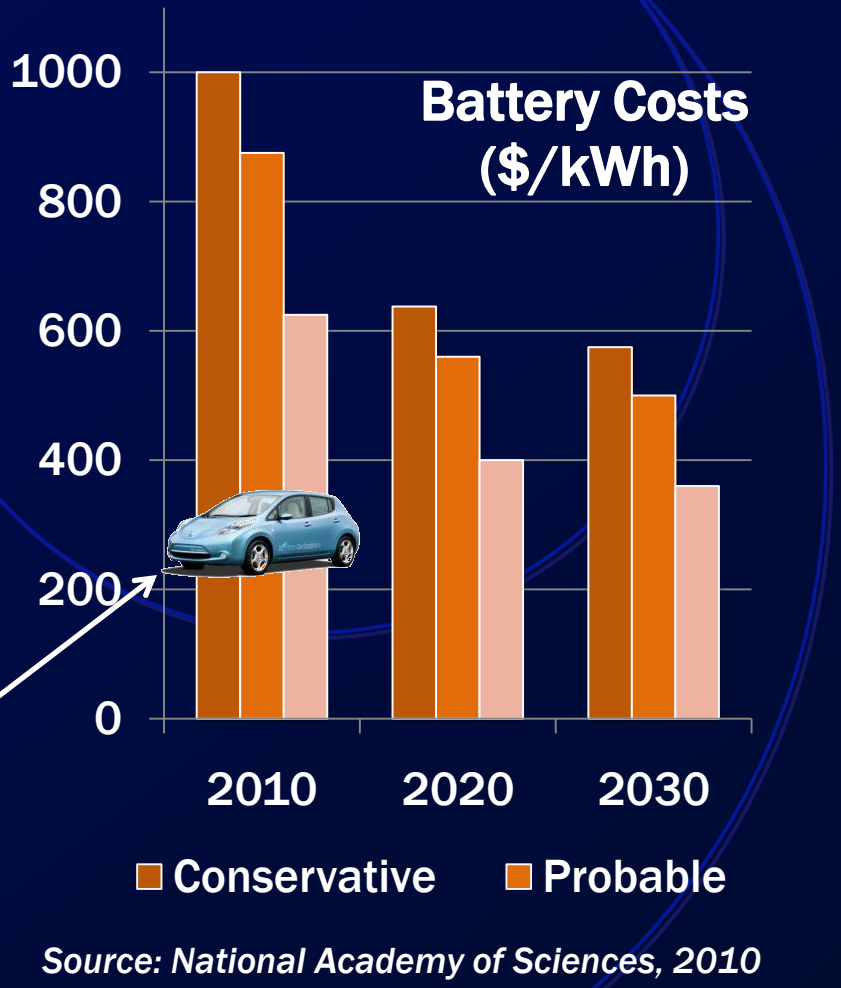
CICA = Cost, Refueling Infrastructure, and Consumer Acceptance

# Alternative Vehicle Barriers Today

- Cost
  - The Nissan Leaf battery pack costs about $9,000
  - The Chevy Volt is twice the price of it's conventional counterpart (Chevy Cruize)
  - Toyota FCV expected to cost $50k in 2015
- Technology
  - New battery chemistries needed for range
  - FCVs not deployed to mass market yet
- Market Acceptance
  - It took 10 years to get to 1 million HEVs
  - Recharging/refueling infrastructure nonexistent

# EV Technology - Cost

- EV drivetrain is simpler
- Battery pack is the major cost
  - 100-mile PEV needs 24kWh
- Much uncertainty in actual cost
  - Nissan says Leaf battery pack costs ***$375/kWh***

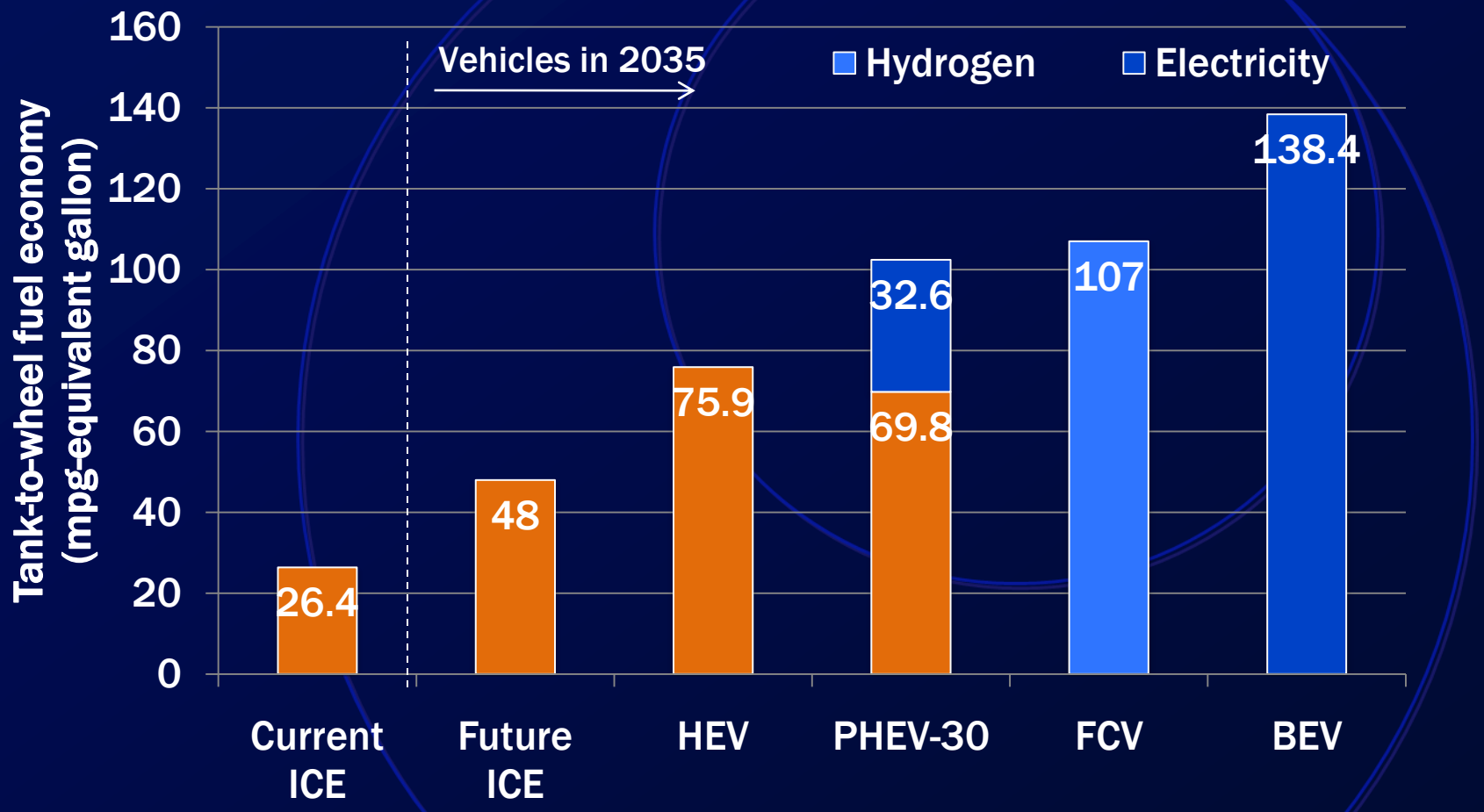



*Source: National Academy of Sciences, 2010*

# Fierce Competition In the Future

- 2035 conventional vehicle can be 50 mpg and hybrid can be 75 mpg (both on-road)
- A 75 mpg HEV is difficult competition for EVs, PHEVs, FCVs:
  - Uses 187 gallons of gasoline/yr @ 14,000 miles/yr
  - < $1,000/yr in fuel costs even at $5 gasoline!
- Conclusion: need dramatic cost reductions, performance improvements *and public acceptance* for new fuels to compete

# Car Shopping In 2035




**Note: a graph of lifecycle GHG emissions may look *very* different, depending on hydrogen and electricity production**

*Source: Bandivadekar, A. et al., 2008*

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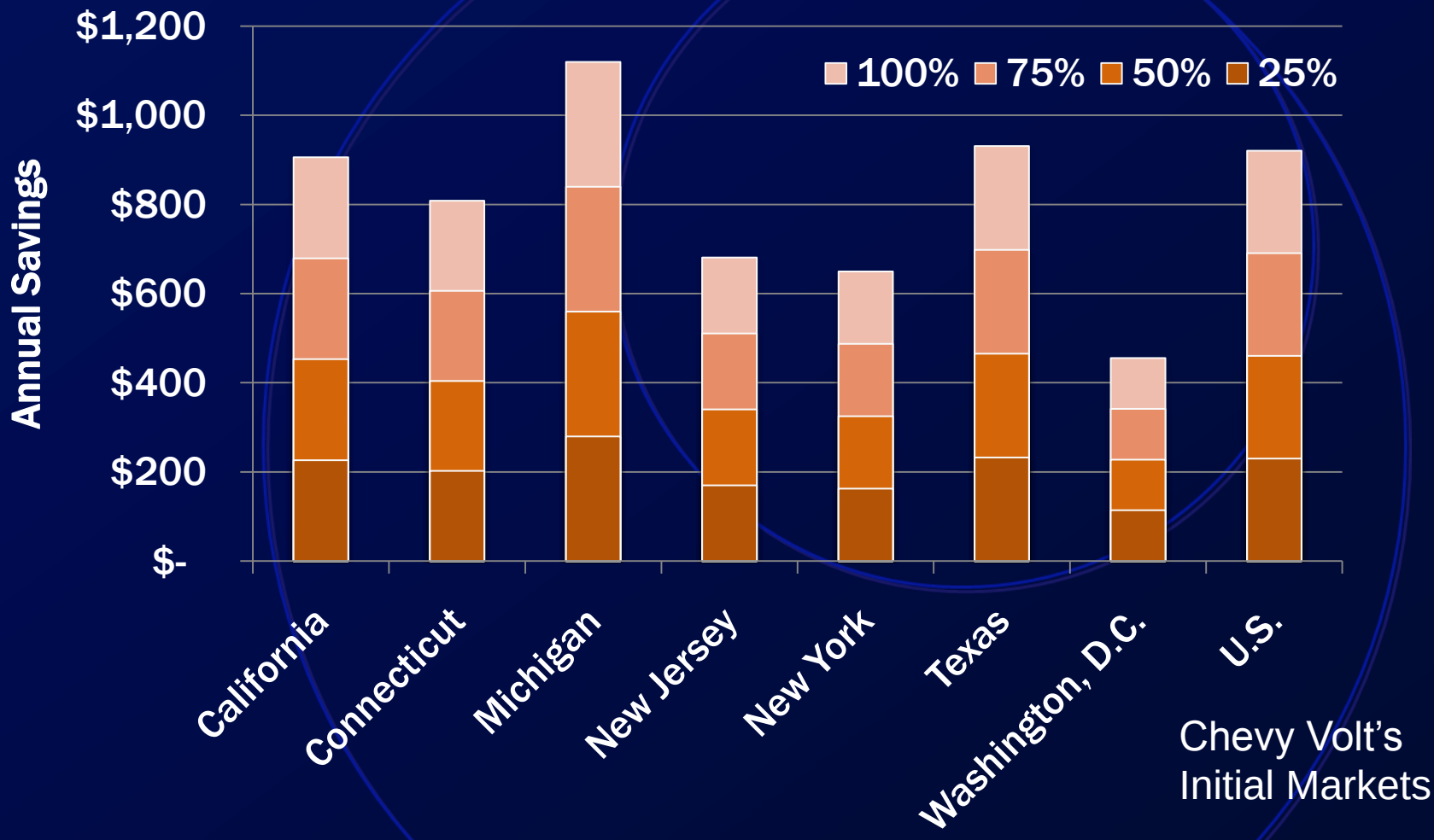
# Spurring A New Market

- Leveraging purchasing power to move down the cost curve
  - Federal government is the single largest consumer of energy (over 600k vehicles)
  - Learning-by-doing, economies of scale
- Prove out technology with more vehicles on the road
  - Increases consumer acceptance
  - Encourages automakers to develop next generation

# Electrifying Miles Saves Money




*Assumes 35 mpg for ICE and uses region-specific data including avg VMT per person, avg electricity rates from 11/2009-11/2010, and average gasoline prices in February of 2011.*

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# Case Study: U.S. Postal Service

- Operates more than 217,000 vehicles
- Drove 1.249 billion miles in 2009
- Consumed 144.25m gallons of gasoline and 1.91m gallons of alt fuel in 2009
- Fleet averaged 8.55 mpg
- Electrifying the gasoline miles would have saved ~$90 million in one year!


# Reducing Greenhouse Gas Emissions from U.S. Transportation

*A new and compelling report by the Pew Center released in January 2011*

## For More Information Visit

www.pewclimate.org

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