

---

# ***Discussion on recent changes to the ZEV Mandate***

***Dr. Gerhard Schmidt***

***Hydrogen Technical Advisory Committee***

***Arlington, VA***

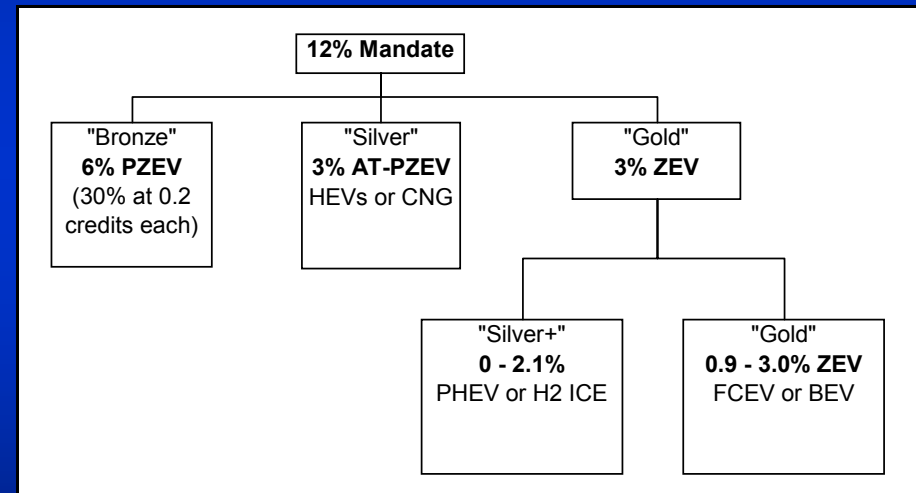
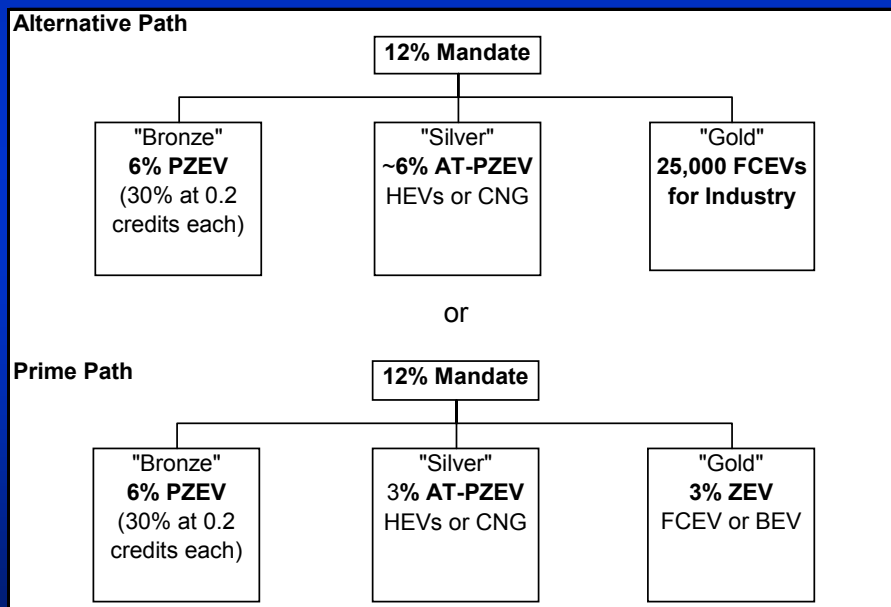
***May 13, 2008***

On March 27, 2008, CARB revised the "Gold" requirement by adding flexibility to introduce Plug-in Hybrids and H2 ICE as "Silver+".

## 2012 – 2014MY ZEV Requirements

### Existing

### Proposed



# Preliminary estimate of Industry's California "Gold" requirement

## 2012 – 2014MY ZEV Requirement

		<b>"Gold"</b> (FCV or BEV)	<b>"Silver+"</b> PHEV
<b>Existing</b>	Alt. Path	25,000* FCVs	0
<b>Proposed</b>	Min. Gold (requires Silver+) or	5357 – 7500 FCVs or 12,500 BEVs	58,333*
	Max. Gold (No Silver+ req'd)	18,000 – 25,000 FCVs or 42,000 BEVs	0

\* Does not include states that have adopted California standards

CARB directed Staff to revise the Low Emission Vehicle Program, Greenhouse Gas Program, and the ZEV Program for the 2015MY+.

- Low Emission Vehicle Program
  - PZEVs fully incorporated into LEV III
- Greenhouse Gas Program
  - HEVs fully incorporated into Pavely II
- ZEV Program
  - Concentrate on “Gold” (i.e. FCVs and BEVs) and “Silver+” (i.e. PHEV)
  - More aggressive targets than today  
(in 2015 – 2017MY, 3% Gold / 3% Silver+ or 6% Gold)
- Rulemaking expected in 2009

## ZEV Revision Observations

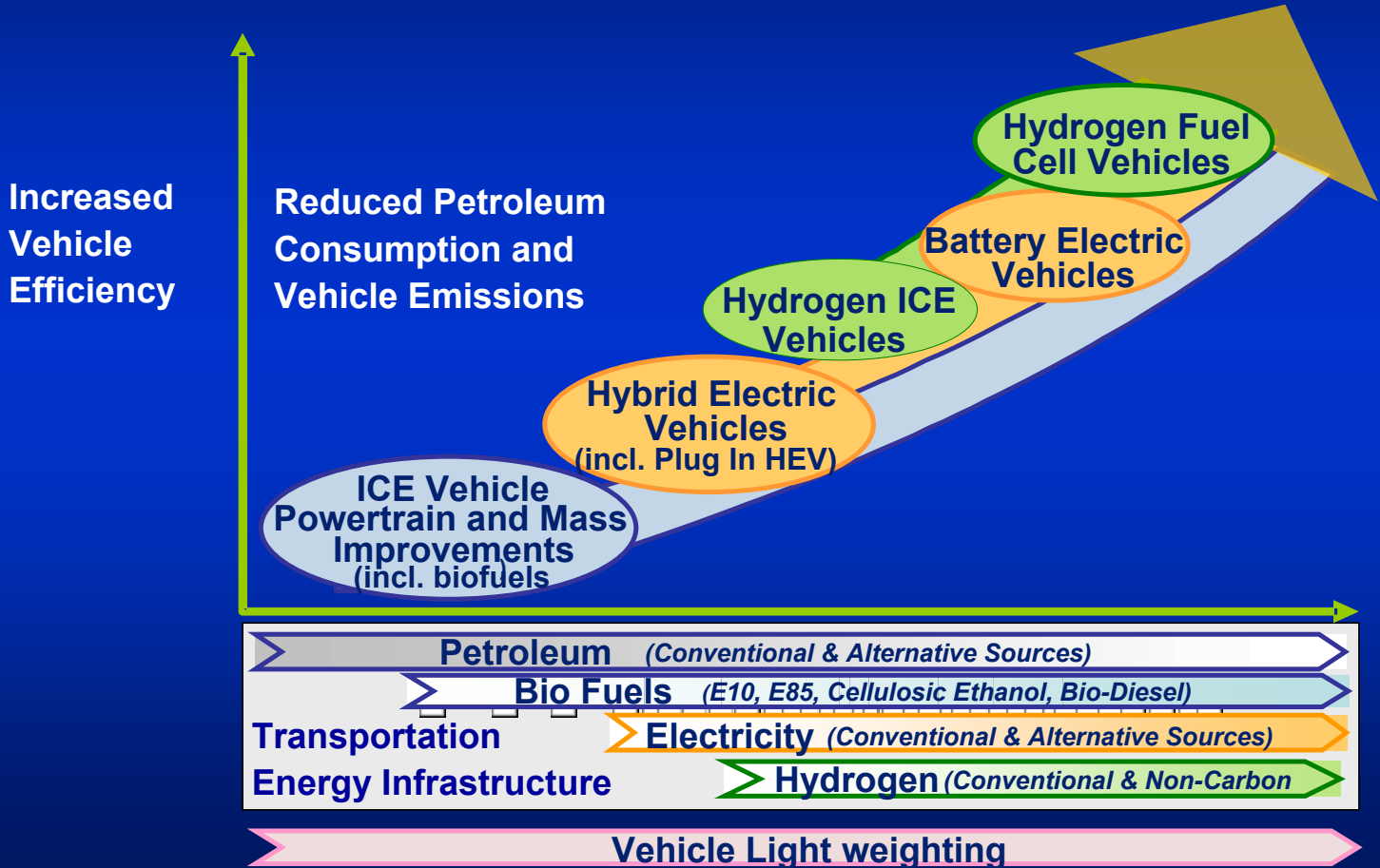
### CARB Actions

- Continues to set technology forcing targets
- Continues to regulate specific technologies
- Electric and hydrogen vehicle technology pathways regulated to a timeline and volumes
- CARB recognizes need for hydrogen infrastructure to be addressed in future rulemaking

### Observation

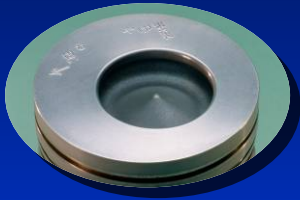
- Adjustments may be needed if technology improvements or market acceptance does not meet expectations
- Customers choose vehicles based on cost, performance & convenience.
- Despite good progress on Batteries and Fuel Cells, technical and commercial challenges remain, with no clear winner or timely solution to compete with conventional powertrains
- Hydrogen infrastructure must be addressed – Energy, Government and other stakeholders must be involved

# Infrastructure development opportunities will require focus as OEM vehicle level technology progresses



# Vehicle Technology Portfolio

## Diesel Engines



## Advanced Diesel Engines



## Alternative Fuel Engines

### HEV



### Fuel Cell



## Gas Engines



## Advanced Gas Engines



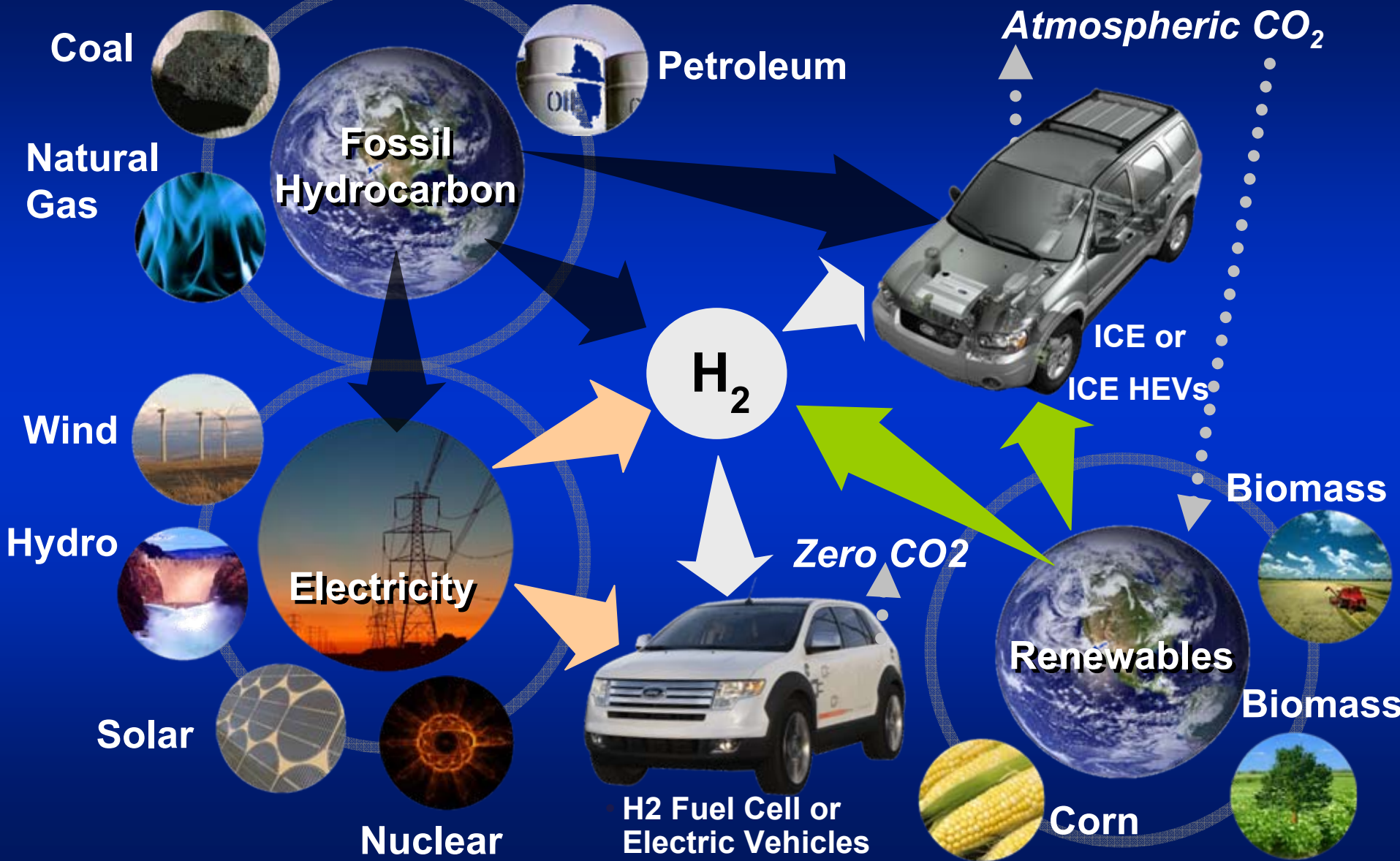
### PHEV



### H<sub>2</sub> - ICE



# Potential Transportation Energy Pathways





---

## Comments / Summary

- CARB's goal for sustainable ZEV transportation is laudable
  - OEMs are doing extensive work to make these technologies viable
- Industry recognizes that customer demand for green vehicles is undergoing unprecedented change
- Technological and commercial challenges for zero emission vehicles still exist
  - Must be monitored to make appropriate adjustments to the ZEV regulations, as necessary
- A collaborative approach that includes all the stakeholders is needed- similar to FreedomCAR and Fuel Partnership
- Automotive manufacturers cannot do this alone

---

# Discussion