

# **Perspectives on FCVs and H2 from the Left Coast**

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# Toward the H2 Economy?!

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- Washington Policy
- Industry
  - Prototypes
  - Toyota and Honda FCVs
- California Fuel Cell Partnership
- ZEV program
  - Selling out or pragmatic progress?
- SC AQMD programs
  - H2 (not diesel)
- AB 1493 (GHG reduction)
  - More than a token gesture?

# Washington Policy

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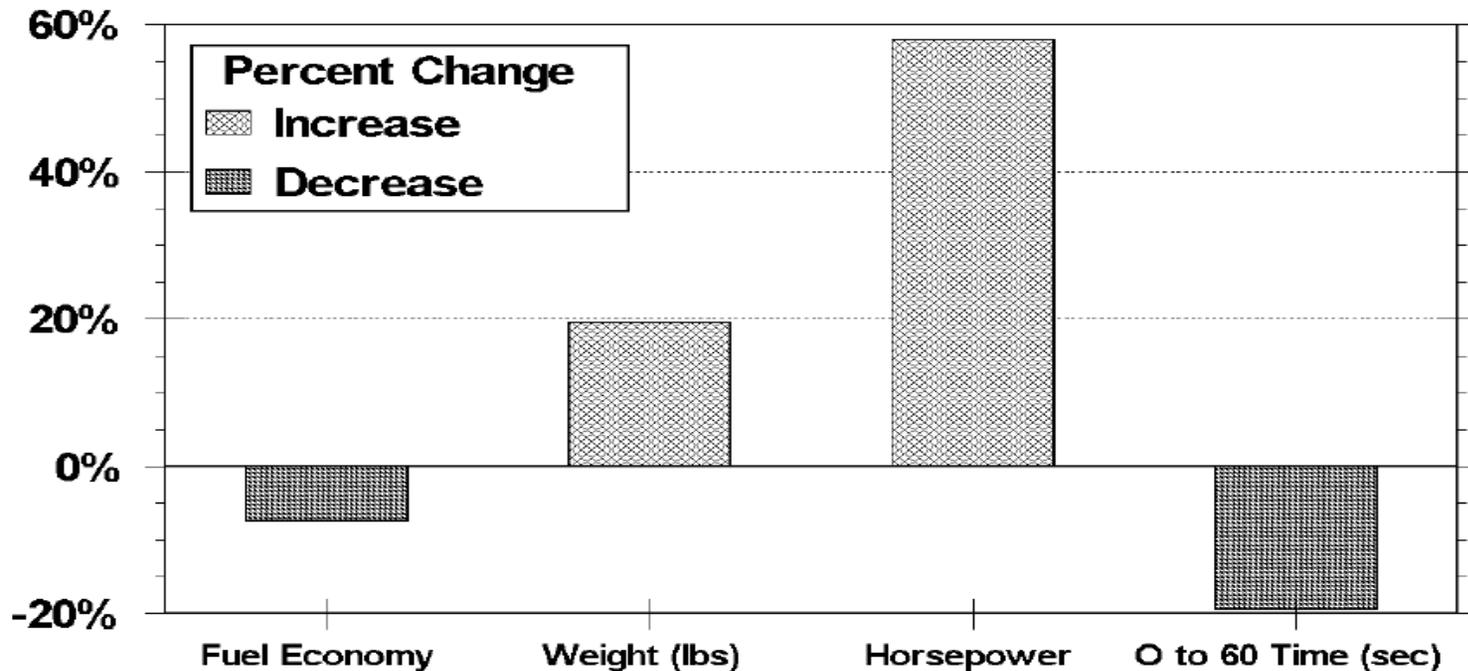
- Funding from DOE for demos and H2?
- Tax incentives for FCVs and H2 stations?
- Other market incentives?
- Tightened CAFE?
- GHG policy?
- What kind of H2 economy?
  - 3 Ds: Decarbonized, distributed, democratic?
  - Being hijacked?

*The key policy challenge is more related to moving technology from lab to marketplace than supporting development of new technology – **govt needs to alter market signals!***

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*Impressive advancements continue to be made in fuel “efficiency” technology, but because power and weight are increasing even faster, fuel “economy” is worsening (in US).*

**Percent Change Since 1986 in Light Vehicle Characteristics**



Source: US EPA

*If trends continue ...*

*The New* **Kenworth Pilgrimage**

***With a fuel cell?!***



# Industry

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*.... from Michigan*

GM Autonomy/Hy-Wire



Ford Model U



# Toyota and Honda

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*Placing FCVs with UC Davis, UC Irvine, and City of LA*



# South Coast AQMD

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- Partial funding for four hydrogen fueling projects in basin: Palm Desert (Stuart), LA Airport (Praxair/BP), Long Beach (BP), and UC Irvine (Air Products/Stuart).
- Goal is to establish a network of 10-15 fueling facilities in Southern California in next 2-3 years.

# California Fuel Cell Partnership

*Objective - Demonstrate viability of FCVs and fueling options.*

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## Automakers

Ford  
DaimlerChrysler  
Honda  
Volkswagen  
Nissan  
GM  
Toyota

## Fuel Providers

ChevronTexaco  
Shell  
BP  
ExxonMobil



## Other

Ballard  
CARB  
Calif Energy Com  
US Dept of Energy

## Associate Partners

Air Products  
Praxaire  
Linde  
Methanex

## Bus Operators

AC Transit  
Sunline Transit

# CaFCP “Accomplishments” -- 2002

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- Placed 20 FCVs into testing and demonstration
- Installed hydrogen fueling station in Richmond, CA
- Installed methanol fueling station at its West Sacramento demonstration center
- Trained several emergency response agencies
- Conducted fuel cell awareness events, including 3-day, 300-mile road rally
- Distributed 1,000 fuel cell learning kits to middle and secondary school teachers

# CaFCP Goals (2003)

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- Place FCVs in fleets -- up to 60 fuel cell vehicles, accumulating up to 265,000 miles
- Place additional hydrogen fueling stations
- Promote fueling station interoperability (common fit and use among vehicles)
- Develop and implement a First Responder training program targeting vehicle/fueling demo communities
- Coordinate with other FCV programs worldwide and promote consistent data collection
- Expand outreach to California public multiple public events and activities, familiarizing at least 500,000 people with FCVs and H<sub>2</sub>
- Distribute 1000 additional teacher learning kits
- Prepare for broader rollout of vehicles and fueling in fleets during 2004 and beyond

# ZEV Program History

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- 1990: ZEV req't adopted by California Air Resources Board
  - 2% ZEVs in 1998
  - 5% ZEVs in 2001
  - 10% ZEVs in 2003
- 1996: ZEV req'ts thru 2002 eliminated (except MOA for "3750" BEVs)
- 1998: New definitions of ZEVs ("partial" credit ZEVs)
- 2002: More proposed refinements of ZEV definitions
- 2002: GM/DCX sue and win temporary (?) delays
- 2003: New amendments being proposed

# ZEV Req'ts for 2003+ (pre-lawsuit)

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10% of light duty vehicles must be ZEVs

2% must be pure ZEVs (gold std)

2% can be advanced technology near-zero vehicles (HEVs and NGVs) (silver std)

6% can be met with gasoline vehicles meeting enhanced SULEV emission stds (bronze std)

- Many ways to get extra credits (early introduction, greater energy efficiency, more ZEV range, use in carsharing, etc)
- Credits are tradable
- \$5000 penalty for each ZEV not made available for sale
- Smaller automakers (smaller than Big 6) do not need to meet 2% pure ZEV rule

# “Gold” ZEV Credits

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- 20% of ZEV requirement (2% of total sales) must be pure ZEVs.
- Qualifying technologies include BEVs and Hydrogen FCVs (and maybe other FCVs)
- Applies only to 6 largest marketers in California
  - GM, Ford, Toyota, DaimlerChrysler, Honda, Nissan

# “Silver” ZEV Credits

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- 20% of ZEV requirement can be met with:
  - HEVs (with extra credit for longer ZEV range)
  - CNG vehicles (meeting enhanced SULEV stds)

# “Bronze” ZEV Credits

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- Can account for up to 60% of ZEV reqt
- Vehicles can be gasoline ICEVs, but must meet enhanced SULEV std:
  - SULEV standard at 150,000 miles and associated OBD II and zero-evaporative emission reqts
  - 150,000 mile emission warranty

# ZEV Program as of Today

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- Virtually no ZEVs are available
  - Full size BEV prod'n eliminated
  - FCVs are not ready
  - How to bridge gap from BEVs to FCVs?
- Many banked credits (NEVs, HEVs)
- Lawsuit by GM, DCX, local dealers
  - at issue are rules that conflict with federal prerogative to regulate fuel economy
  - Preliminary court injunction precludes enforcement in 2003-04, but being appealed
- 2003 changes to be discussed at 27 Feb CARB hearing

# CARB “Strawman Proposal” for Feb 27 Hearing

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- Eliminate credits for fuel improvement gains (result of lawsuit) -- which gives less flexibility to OEMs
- Reduce gold ZEV reqt to 1% for 2005-11
  - Other 1% to be met with HEVs/CNG and H2 infrastructure credits?!

# Proposed CARB ZEV Credits

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Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012+
NEV	1.25	0.62	0.62	0.15	0.15	0.15	0.15	0.15	0.15	0.15
City EV	1.8	1.8	4	4	4	3	1.4	1.4	1.4	1.4
BEV	5.9	5.9	12	10	10	7	3.3	3.2	3.2	2.9
<b>FCV</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>3.75</b>	<b>3.75</b>	<b>3.75</b>	<b>2.9</b>

<http://www.arb.ca.gov/msprog/zevprog/2003rule/1202wkshp/1202pres.pdf>

# California AB 1493

*First regulation of transport-related greenhouse gas emissions in the U.S.*

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- July 22, 2002 – Signed into California law
- January 1, 2005 – Deadline for Air Resources Board (CARB) to develop and adopt regulations of greenhouse gases that achieve maximum feasible reductions from passenger vehicles and noncommercial light-duty trucks
- 2009 – Regulations take effect

# AB 1493 Cannot ...

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- Impose mandatory trip reductions
- Impose land use restrictions
- Impose additional fees/taxes on vehicles, fuel, or miles traveled
- Ban sale of certain types of vehicles
- Require weight reductions
- Limit/reduce speed limits
- Limit/reduce vehicle miles traveled

# CARB will likely ...

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- Use fleet average approach similar to AQ regs
  - Performance based rules, not prescriptive
    - Allow trading between manufacturers and across pollutants, though unclear how to handle global warming potential and black carbon factors
  - Exempt small manufacturers
  - Include intermediate manufacturers (VW and BMW)
- ... but unclear how to apply standards
- By weight, vehicle type, or attributes?
  - Formulated as g/mi/vehicle or g/company (baselines)?

# Queries for endless debate

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*Query #1: Who solves pivotal H2/FCV challenges?*

*Query #2: What is the appropriate role of gov't and industry for each of these challenges?*

*Query #3: Role for partnerships such as FreedomCAR, CaFCP?*



*Thank You*