

ZEVs for California—Building an Ultra Low Carbon Transportation System

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California Fuel Cell Partnership



Demonstration Phase Wrapping Up

- ▶ 300 passenger cars and buses; 2.8 million miles
- ▶ Building retail stations
- ▶ Preparing communities
- ▶ Codes and standards for retail H₂ sales
- ▶ Leased vehicles & serial production



Deploying Vehicles & Stations



CaFCP Action Plan



46 Stations

Santa Monica, Irvine, Torrance, Newport Beach, San Francisco, Sacramento

3 Focus Areas

Passenger vehicles
Transit buses
Regulations, Codes & Standards

4 Years

Funding 2009-2012
Stations begin operation 2009-2014

\$180 Million

Industry and government investment

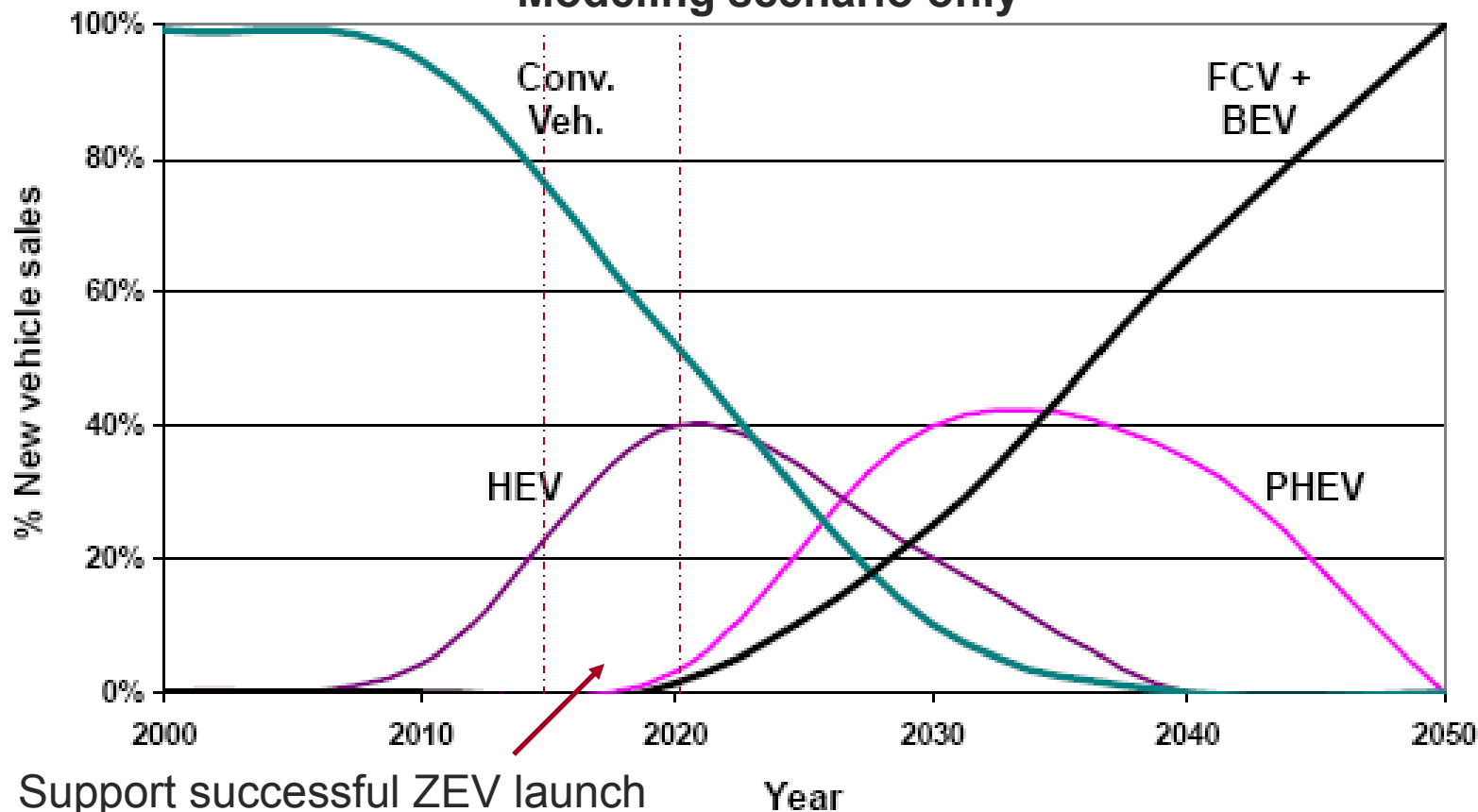
Hydrogen Station Challenges

- ▶ Need more stations, faster
- ▶ Difficult business model
- ▶ Not a level playing field
- ▶ Unpredictable annual funding cycles
- ▶ Perception of competing technologies

- ▶ **ZEV Regulation**—Requires automakers to produce zero emission and advanced technology vehicles
- ▶ **ZBus Regulation**—Requires transit agencies to operate zero-emission buses
- ▶ **Low Carbon Fuel Standard**—Requires 10% lower carbon intensity of transportation fuels by 2020
- ▶ **Clean Fuels Outlet**—Requires large station owners to supply alternative fuels
- ▶ **AB 118**—State investment plan for funding alternative fuel infrastructure
- ▶ **SB 1505**—Requires 33% renewable hydrogen today

ZEV: Emphasis on “Gold”

Modeling scenario only



HEV	4% sales in 2010 (launch in 2000)	<i>10 Year Sales Growth</i>
PHEV	3% sales in 2020 (launch in 2010)	
BEV	1% sales in 2020 (launch in 2010)	
FCV	3% sales in 2025 (launch in 2015)	

Low Carbon Fuel Standard

- FCVs and BEVs greatly reduce GHGs, but demand for hydrogen and electricity will be too low through 2020 for energy companies to use these fuels as a primary LCFS compliance strategy.

Well-to-Wheels GHG (based on carbon intensity)		
Pathway	Grams of CO ₂ per mJ of fuel energy	Reduction compared to gasoline
Hydrogen (CA mix)	33.09	65%
Electricity (CA marginal)	34.90	64%
Electricity (CA mix)	41.37	57%
Gasoline	95.85	0%

Clean Fuels Outlet

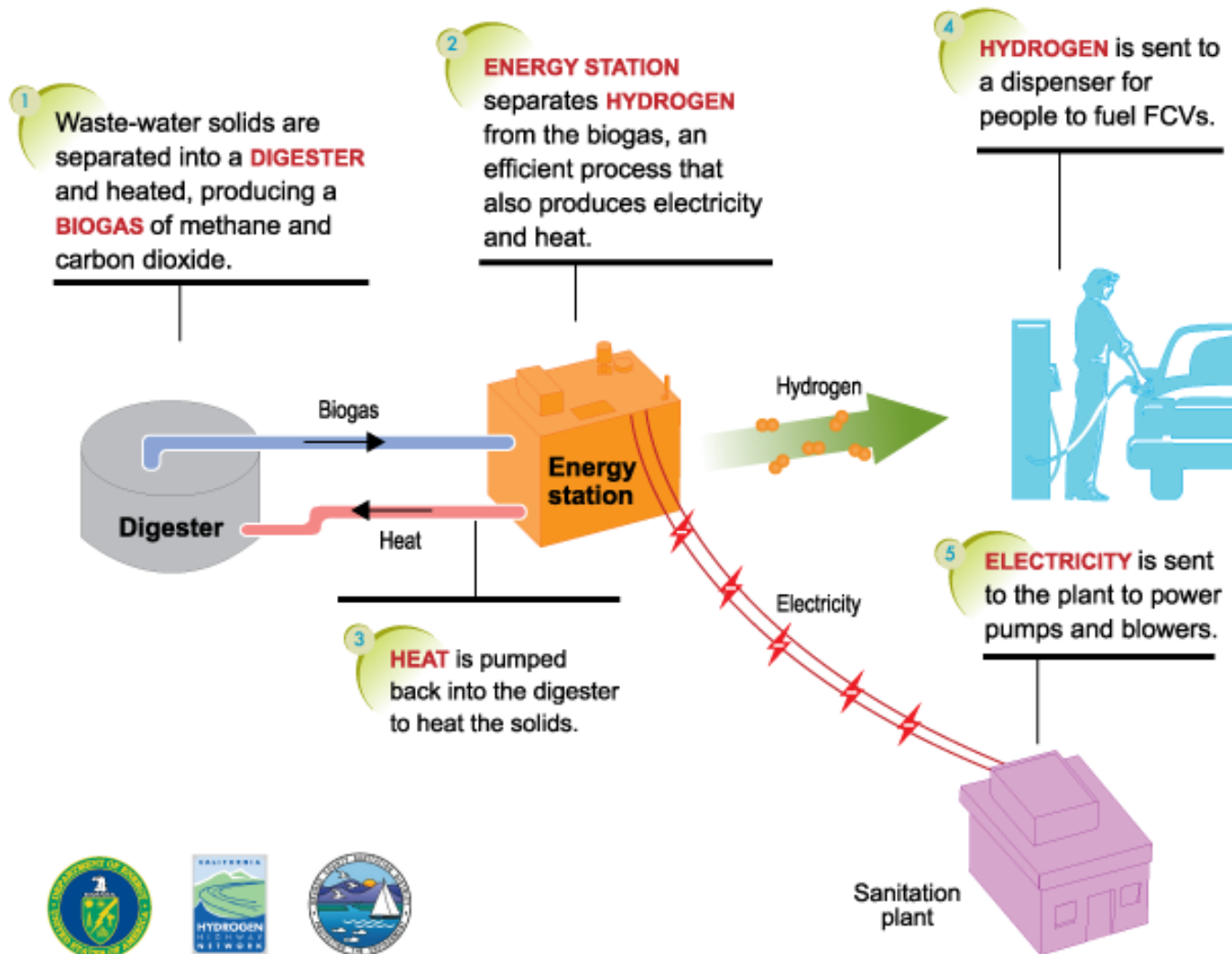


- ▶ Requires large station owners to supply alternative fuel when sales >20,000 vehicles
- ▶ ARB will review status in Dec. 2009.
 - Is H₂ infrastructure developing on its own?
 - Is government funding available and being used?
 - Is regulation needed to assure adequate H₂ infrastructure?
- ▶ If needed, regulation will be updated in late 2010

Alternative Fuel Funding (AB118)

- ▶ \$120 million annually for 7 ½ years (expected)
 - Up to \$40 million for H₂ stations through 2010
 - \$3.5 million for H₂ standards and certification
- ▶ Federal & local government funds needed to match state and industry cost-share
 - Especially for more expensive renewables and to support small business owners

New Technologies



Hydrogen stations for customers



California Commitment



Questions or Comments?

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