Hydrogen Infrastructure in California

Anthony Eggert

California
by the numbers

GSP ~$1.9 Trillion (2009)

Electricity Consumption
~287,000 GWh (2008)

Peak Demand
~64,000 MW (2006)

Energy Expenditures (2008)
~$33.5B Electricity
~$17.6B Natural Gas
~$80B Petroleum/products

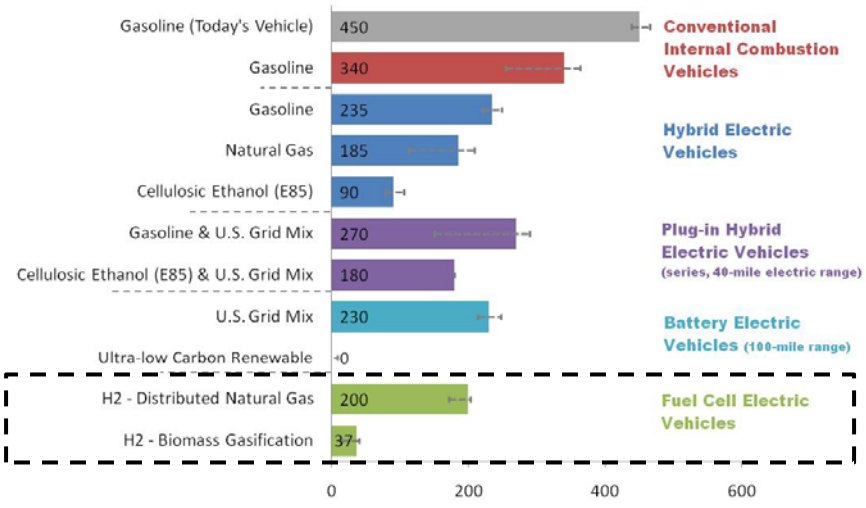
California's Plan for Transportation

Low-Carbon Fuels
Diversify fuel supply toward alternative and renewable fuels

Cleaner Vehicles
Efficient, low/zero emission vehicles for passenger travel and goods movement

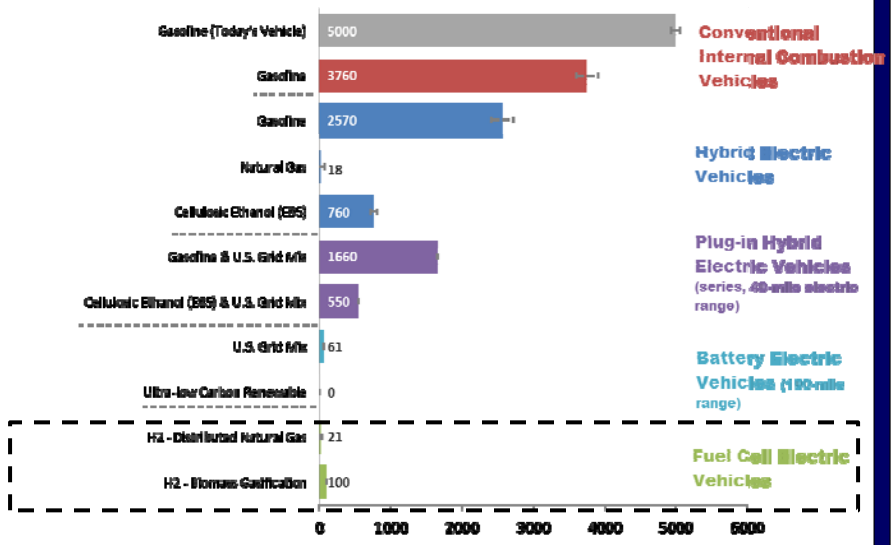
Efficient Mobility
Better land use planning, walking, biking and transit infrastructure

Well-to-Wheel Greenhouse Gases



Source: USDOE, 2010

Well-to-Wheel Petroleum Use



Source: USDOE, 2010

Government Role in Enabling Energy Technologies

The "Pipeline" Strategy to drive innovation

- **Research and Development***
  - Emerging technology development and demonstration
  - Economic and engineering analysis

- **Deployment Incentives**
  - Programs and incentives for most efficient products
  - Energy-efficient economic development incentives
- **Codes, Standards, and Permits**
  - Require minimum standards for appliances and buildings
  - Promote reach standards
  - CEQA for Power Generation
- **Fiscal Policies** "Leveling the playing field"
  - Cap and Trade
  - Tax policy (e.g. Mfg. tax credits)

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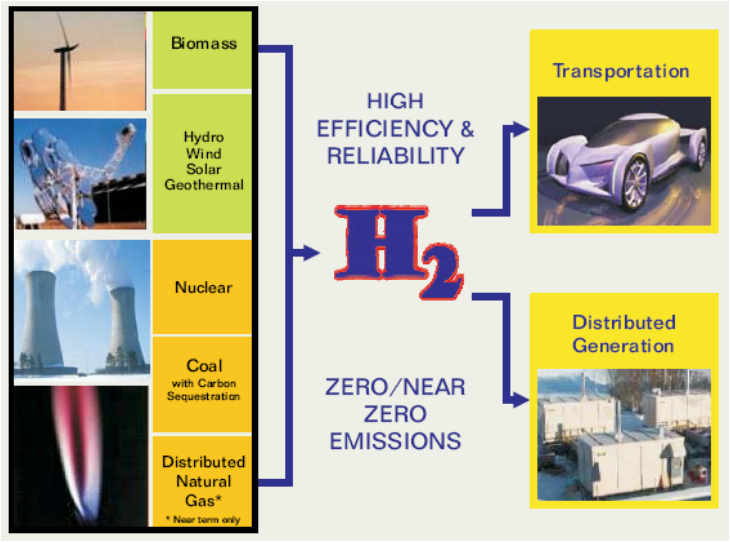
Alternative and Renewable Fuel and Advanced Vehicle Program (AB118)

Funding and Objectives

- ~$150 million/year for 7 Years
- Invest in a **portfolio** of alternative low-carbon and renewable fuels and advanced vehicles in California to help meet our energy, environmental, and economic goals.
- Fuel production, distribution and dispensing
- Component and vehicle development and manufacturing
- Workforce training
- Education and outreach
- Environmental, market and technology assessments

California's Hydrogen Network

Hydrogen Infrastructure



Example: Northern California Bus Station

- Emeryville
- 60 kg/day from solar
- 180 kg/day from reformer
- 6 buses & 20 cars daily

Example: Two LA-area Stations

Los Angeles (CSULA)

60 kg/day

On-site solar electrolysis

Open Q1 2011

Fountain Valley

100kg/day

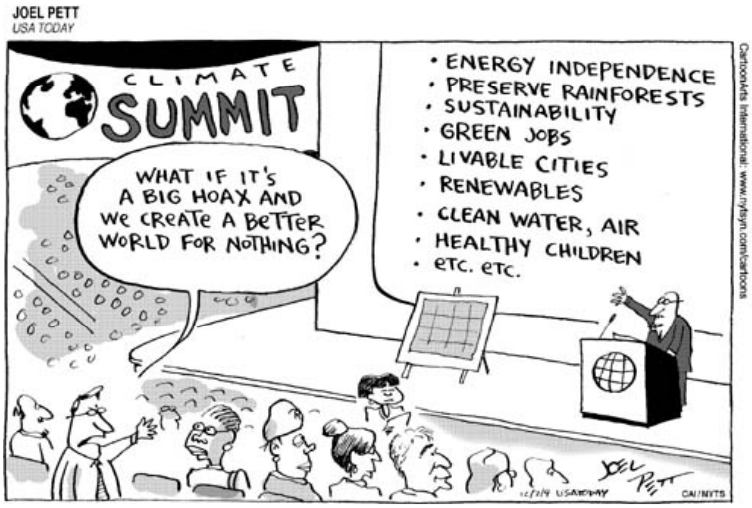
Hydrogen from biogas

Open Q1 2011

California Solicitation "Firsts"

- Public access and "retail-like" design
- Detailed automaker commitment letters
- Multiple stations per award
- Additional incentives provided for:
  - lower cost=higher % cost share
  - Fast construction (<18 months)
  - Exceed the GHG/Renewables Requirement
- Funded stations eligible for:
  - Station upgrades
  - Operation beyond three-year contract

What if?



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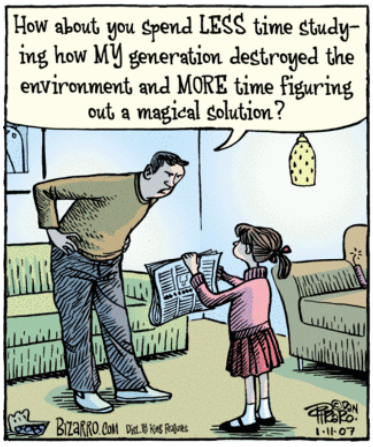
THANK YOU!



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Resources

- California Energy Commission Website:
  - http://www.energy.ca.gov
- Energy Action Plan:
  - http://www.energy.ca.gov/energy_action_plan/index.html
- CEC Integrated Energy Policy Report
  - http://www.energy.ca.gov/energypolicy/
- California Climate Change Efforts:
  - http://www.climatechange.ca.gov/

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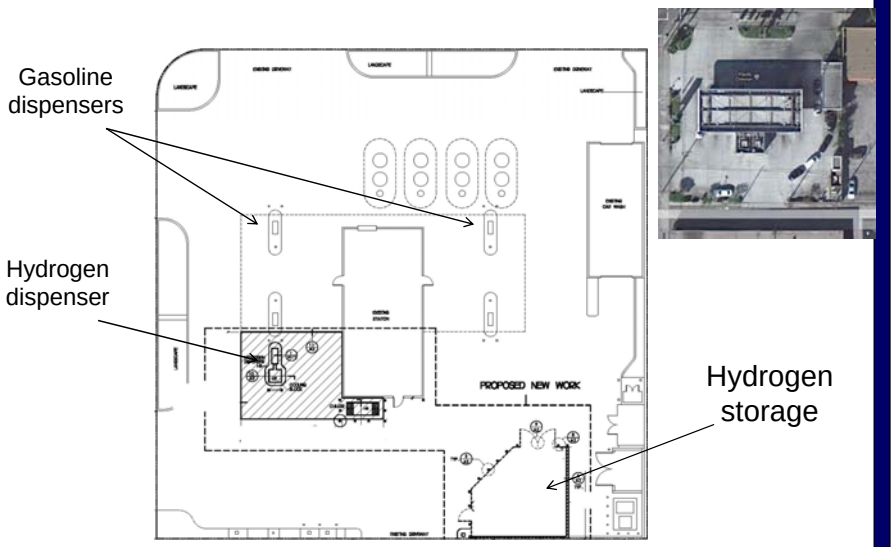
Public Stations – Retail Ready