

# Transportation and Stationary Power Integration Workshop

**A California Perspective  
Monday, October 27th, 2008**

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California Air Resources Board**



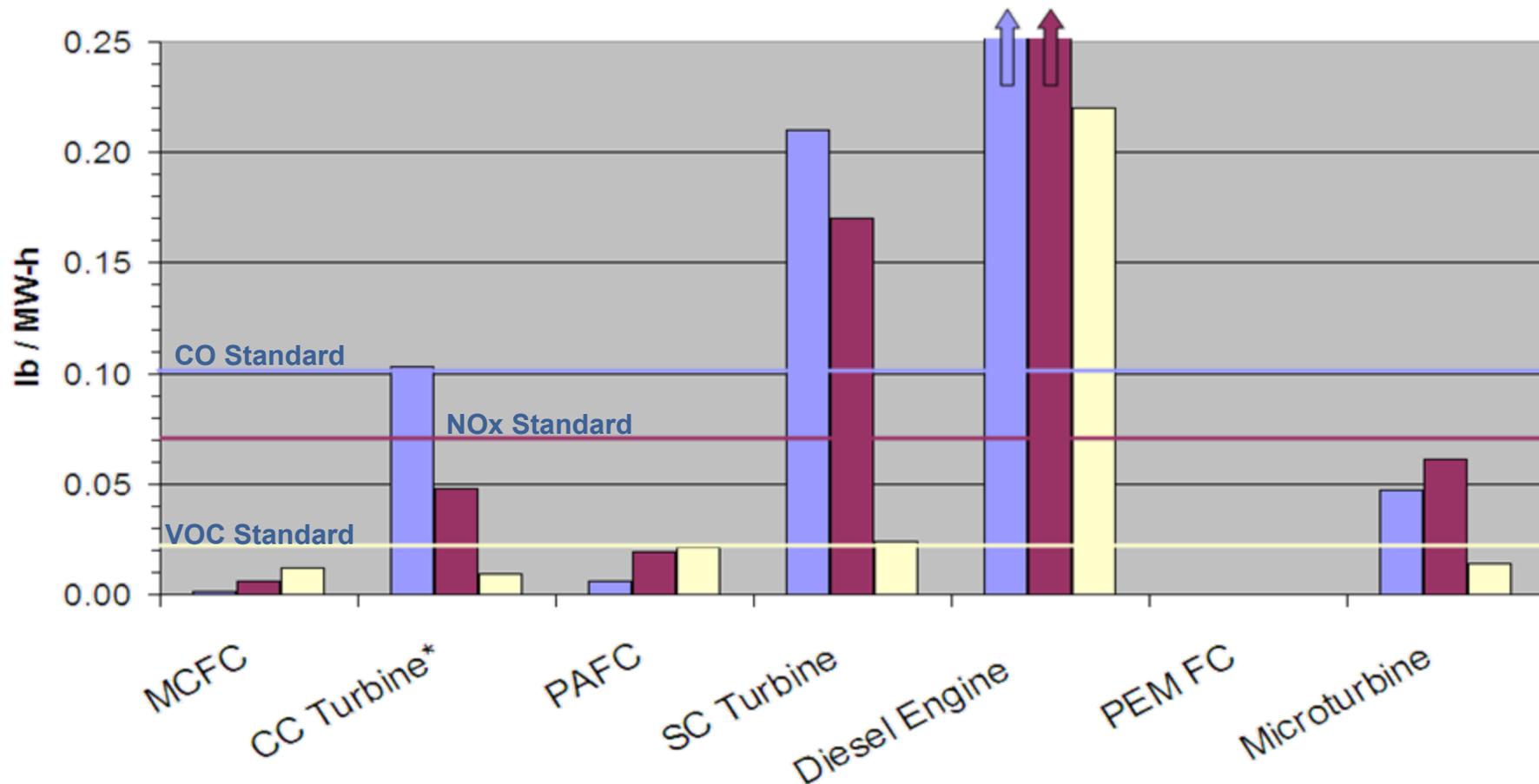
# Fuel Cell Sites in California



- Wastewater treatment
- Hydrogen refueling
- College campuses
- Manufacturing
- Hotels
- Offices
- Military
- CHP

# Fuel Cells Vs Conventional DG: Criteria Pollutants

■ Carbon Monoxide (lb / MWh) ■ Nitrous Oxide (lb / MWh) ■ Volatile Organic Compound (lb / MWh)



Horizontal lines indicate 2007 CARB DG Standards

\* Combined cycle turbine placed for reference only.

# California drivers for a hydrogen future

2007	<ul style="list-style-type: none"><li>● <b>AB 118: Alternative &amp; renewable fuel and technology incentive program</b></li><li>● <b>EO S-01-07: Low carbon fuel standard</b></li><li>● <b>CARB zero emission vehicle program</b></li></ul>
2006	<ul style="list-style-type: none"><li>● <b>AB 32: Global Warming Solutions Act</b></li><li>● <b>SB 1505: Environmental standards for hydrogen production</b></li></ul>

# California regulations

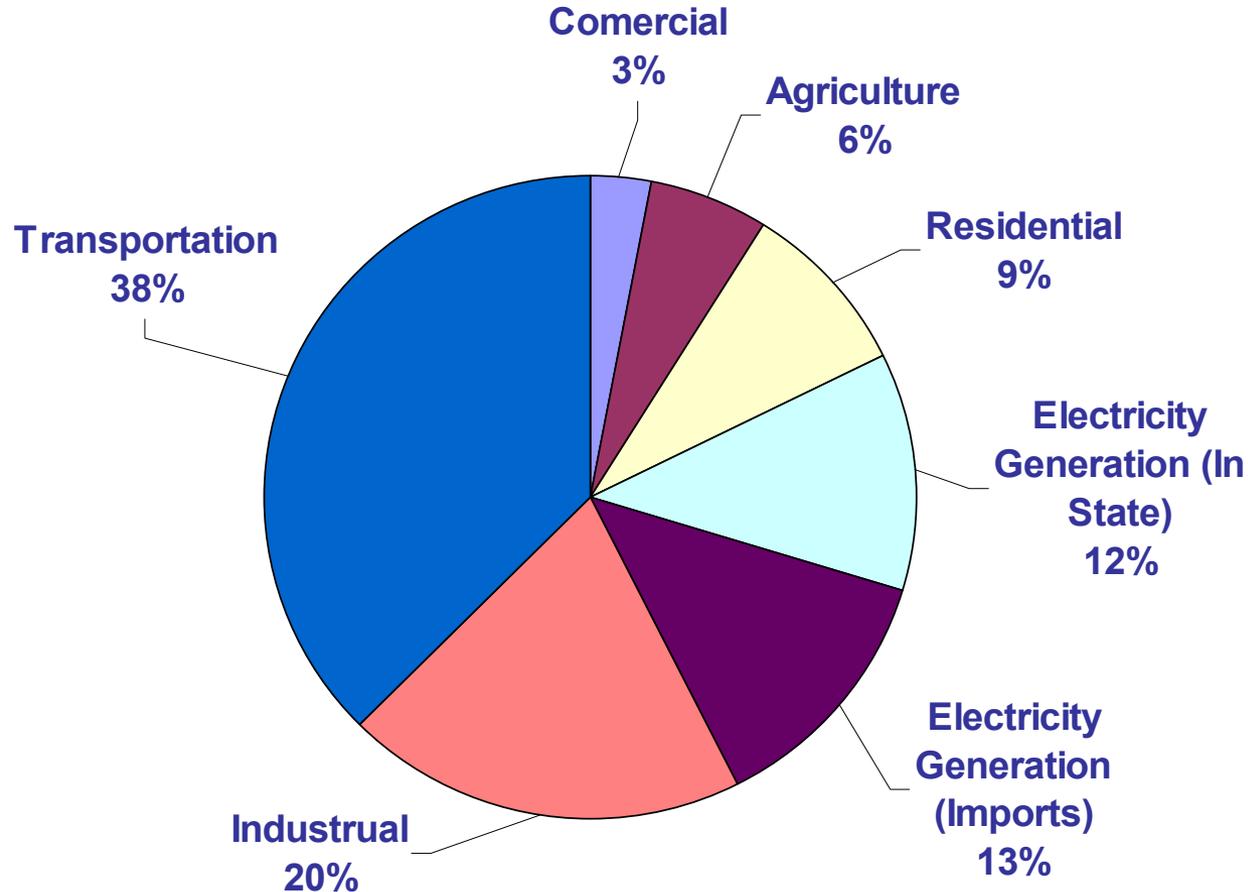
# **AB 32: California Global Warming Solutions Act**

- **2020 GHG limit at 1990 level**
  - **Acknowledges that 2020 is not the endpoint**
- **ARB to monitor/regulate GHG sources**
  - **Air Resources Board lead, but extensive collaboration with other agencies**
- **Must not detract from ARB's health-based programs**

**[www.arb.ca.gov/cc/cc.htm](http://www.arb.ca.gov/cc/cc.htm)**

# AB 32: California Global Warming Solutions Act

## 2004 GHG emissions by Sector



**Gross emissions: 484.4 MMT CO<sub>2</sub>e**

[www.arb.ca.gov/cc/inventory/data/graph/graph.htm](http://www.arb.ca.gov/cc/inventory/data/graph/graph.htm)

# EO S-01-07: Low Carbon Fuel Standard

- **10% reduction in average fuel carbon intensity by 2020**
- **Applies to providers of fuel used for:**
  - **on-road and off-road transportation**
  - **off-road equipment**
  - **locomotive applications**

**[www.arb.ca.gov/fuels/lcfs/lcfs.htm](http://www.arb.ca.gov/fuels/lcfs/lcfs.htm)**

# Senate Bill 1505 Environmental Standards for Hydrogen Production

- **Emission reduction requirement:**
  - 50% reduction of NOx plus ROG
  - 30% reduction of GHG
  - No increase in toxic air contaminants
- **Energy source requirement**
  - 33.3% renewable hydrogen
- **Threshold**
  - 3,500 metric tons/year (3,500,000 kg/yr)

[www.arb.ca.gov/msprog/hydprod/hydprod.htm](http://www.arb.ca.gov/msprog/hydprod/hydprod.htm)

# Latest California funded hydrogen stations

# CA Funded Hydrogen Stations

<b>Site</b>	<b>Renew-able</b>	<b>Feedstock</b>
<b>Orange County Sanitation District</b>	<b>100%</b>	<ul style="list-style-type: none"><li>● <b>Biogas to H2 and electricity</b></li></ul>
<b>AC Transit</b>	<b>100%</b>	<ul style="list-style-type: none"><li>● <b>Onsite photovoltaic</b></li><li>● <b>Purchase local renewable rights</b></li></ul>
<b>California State University, Los Angeles</b>	<b>33%</b>	<ul style="list-style-type: none"><li>● <b>Purchase LADWP Green Power's renewable electricity</b></li></ul>

# Orange County Renewable Hydrogen Station

- \$2,700,000 match funding from State.
- Highly efficient
- Produces electricity, heat, and hydrogen from digester gas.
- Provides renewable hydrogen to support the Hydrogen Highway.
- Project will provide valuable data to ARB.



**AIR PRODUCTS** 



FuelCell Energy



National Fuel Cell Research Center



# California funding mechanisms

# Hydrogen Highway Station Solicitation

- RFP Release fall 2008, for more details visit: [www.hydrogenhighway.ca.gov](http://www.hydrogenhighway.ca.gov)
- \$7 Million in funding
- Primary focus for stations in LA region.
- Secondary focus in Sacramento, San Francisco, and San Diego.
- Station should be operational in mid 2010.

## Key Specifications:

- 5 minute filling time for 5kg hydrogen.
- 350 bar and 700 bar option.
- Dispensing 50kg/day

# Self Generation Incentive Program (SGIP)

## 2008 Rates

Incentive Levels	1 <sup>st</sup> MW (\$/Watt)	2 <sup>nd</sup> MW (\$/Watt)	3 <sup>rd</sup> MW (\$/Watt)	Max Size
Level 2 (Renewable)	\$4.50/W	\$2.25/W	\$1.125/W	5 MW
Level 3 (Non-renewable)	\$2.50/W	\$1.25/W	\$0.625/W	5 MW

**Funds up to \$7,875,000 per project**



[www.cpuc.ca.gov/PUC/energy/sgip/](http://www.cpuc.ca.gov/PUC/energy/sgip/)

## AB 118: Alternative fuels and vehicle technologies funding programs.

**\$200 million annually through 2015 to fund air quality improvement projects and develop and deploy technology and alternative and renewable fuels.**

<b>Funding</b>	<b>ARB</b>	<b>\$50,000,000</b>
	<b>CEC</b>	<b>\$120,000,000</b>
	<b>BAR</b>	<b>\$30,000,000</b>

- **ARB's Air Quality Improvement Program**
- **CEC's Alternative and Renewable Fuel and Vehicle Technology Program**
- **BAR's Enhanced Fleet Modernization Program**

## **AB 118: Next ARB workshop,**

### **Public Workshops to Discuss Development of Air Quality Improvement Program (AQIP) Guidelines.**

**November 5, Diamond Bar, California**

**November 6, Sacramento, California**

- **Initial regulatory concepts for AQIP administration, development, and implementation.**
- **Draft FY 2009-10 eligible source categories and funding targets.**
- **Draft AQIP project solicitation and funding mechanisms.**

**[www.arb.ca.gov/msprog/aqip/aqip.htm](http://www.arb.ca.gov/msprog/aqip/aqip.htm)**

## Links to more information

### **ARB incentives, and grants**

[www.arb.ca.gov/ba/fininfo.htm](http://www.arb.ca.gov/ba/fininfo.htm)

### **California Fuel Cell Partnership**

[www.cafcp.org](http://www.cafcp.org)

### **California Hydrogen Highway**

[www.hydrogenhighway.ca.gov](http://www.hydrogenhighway.ca.gov)

### **California Stationary Fuel Cell Collaborative**

[www.casfcc.org](http://www.casfcc.org)

### **National Fuel Cell Research Center**

[www.nfcrc.uci.edu](http://www.nfcrc.uci.edu)

### **UC Davis Institute of Transportation Studies**

[www.its.ucdavis.edu](http://www.its.ucdavis.edu)

### **US Department of Energy Hydrogen Program**

[www.hydrogen.energy.gov](http://www.hydrogen.energy.gov)