



# South Coast AQMD Plug-in Hybrid Electric Vehicle Forum & Roundtable



July 12, 2006

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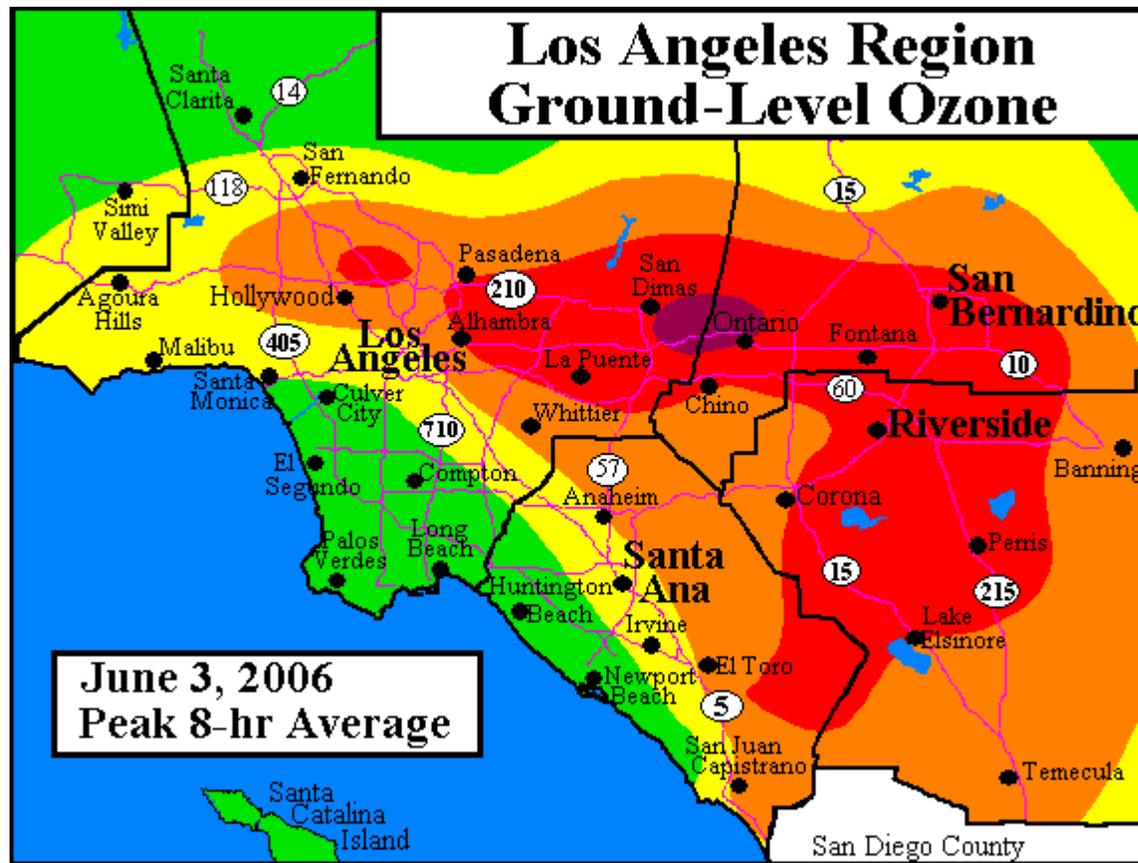
# Goals for the Forum and Roundtable

In order to accelerate PHEV deployments:

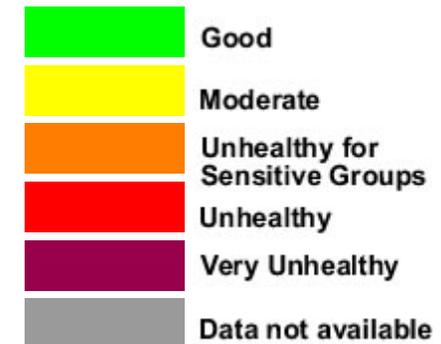
- Discuss and assess capabilities of advanced batteries
- Identify requirements and issues to address
- Initiate dialogue and establish roles

*Develop AQMD PHEV Technology Plan*

# SCAQMD has the Worst Air Quality in the Nation



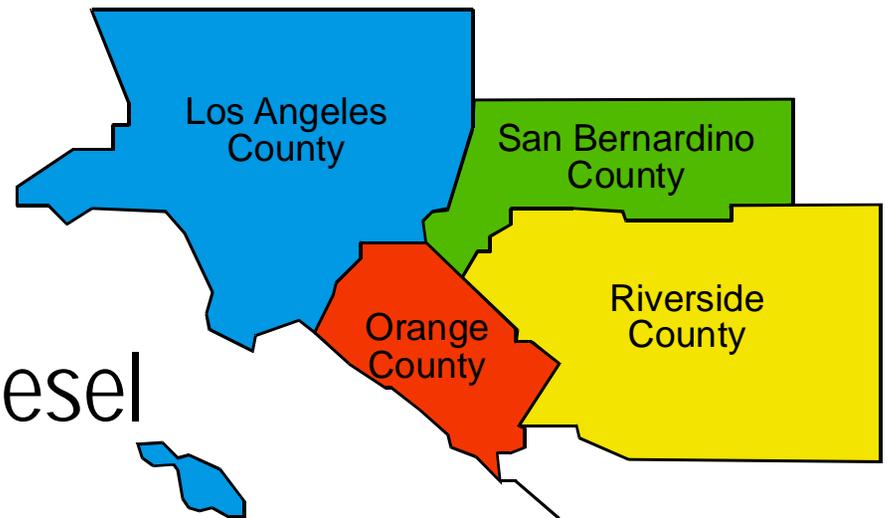
Los Angeles Region  
June 3, 2006



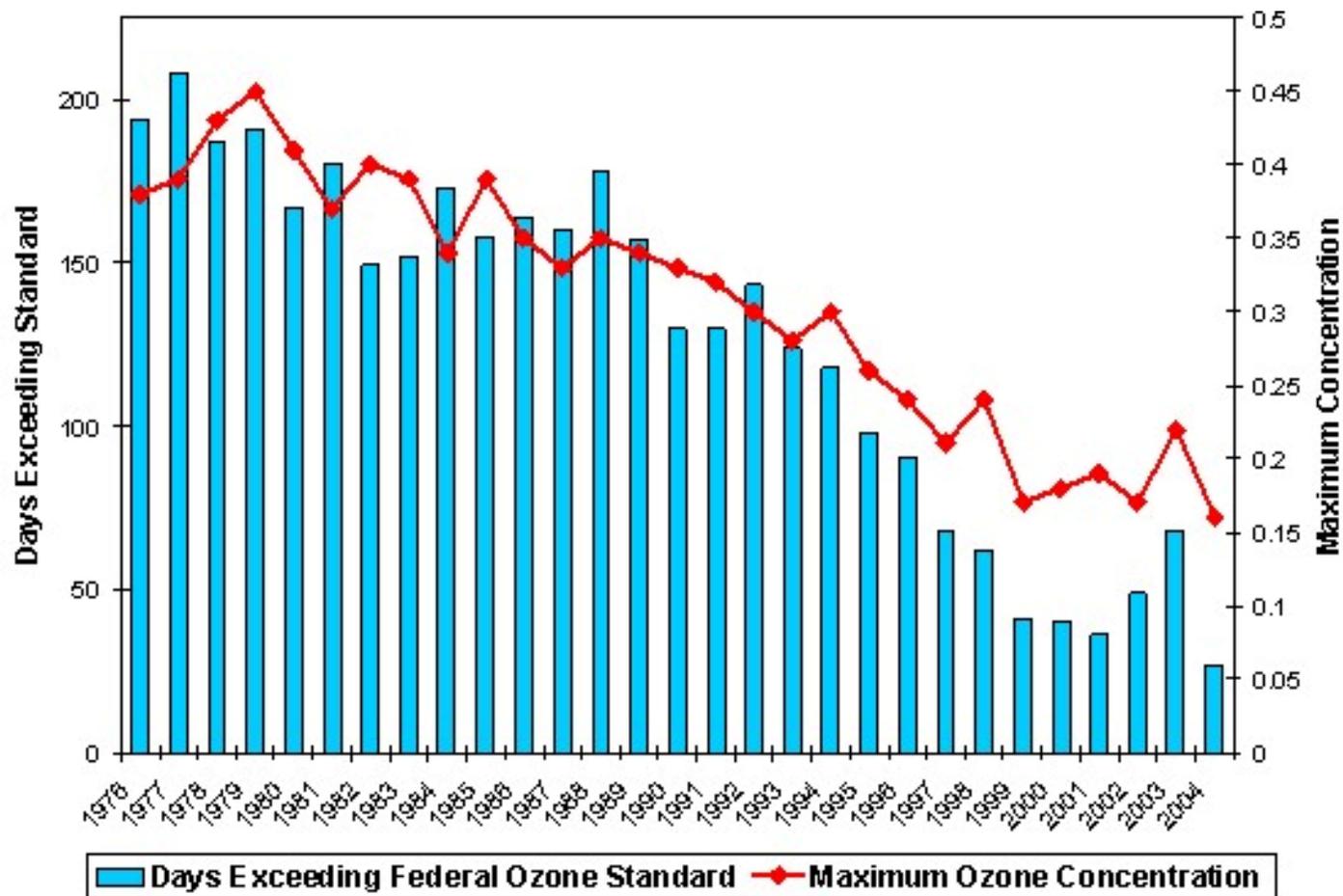
# AQMD Background Setting

## South Coast Basin:

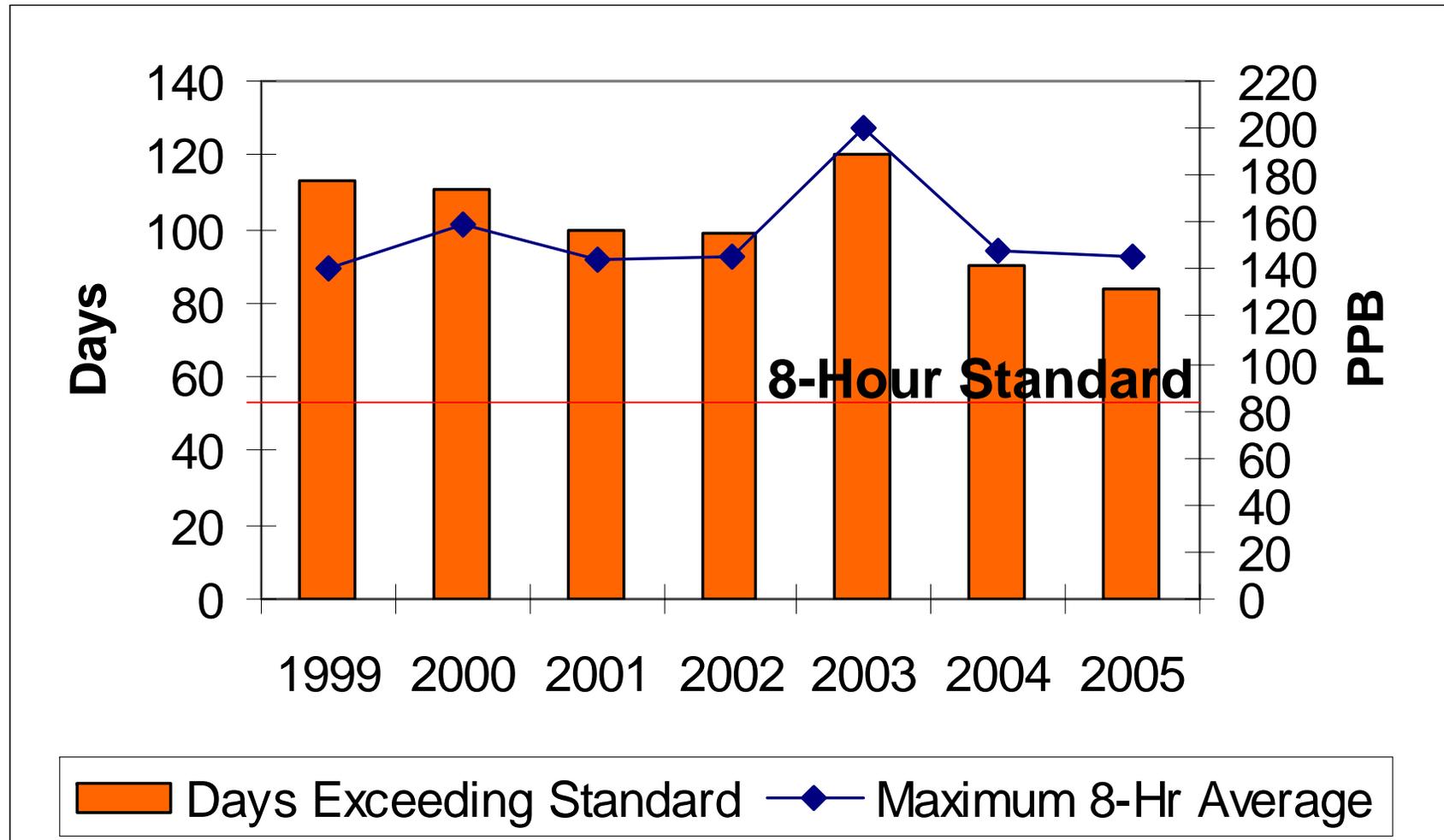
- 4-county region
- 11,000 sq. miles
- 16+ million residents
- Hundreds of thousands diesel vehicles
- Millions of gasoline vehicles
- Combined Ports of Long Beach and Los Angeles are nation's largest cargo gateway



# Days Exceeding 1-Hr Ozone Standard



# Trends of Basin 8-Hour Ozone



# 10 Most Particulate-Polluted Counties in US

(annual average PM<sub>2.5</sub>)

1. **Riverside, CA**
2. **San Bernardino, CA**
3. **Los Angeles, CA**
4. Kern, CA
5. Tulare, CA
6. Allegheny, PA
7. Fresno, CA
8. Wayne, MI
9. **Orange, CA**
10. Kings, CA

# Public Health Issues



LA Times March 25, 2006

## Study Doubles Estimate of Smog Deaths

USC researchers amass measurements of lethal particles that matter from cars and trucks in Los Angeles. The study may double the number of deaths attributed to smog.



## State's Air Is Among Nation's Most Toxic

Only New York has a higher risk of cancer caused by airborne chemicals, the EPA says.

By MARLA CONE

LA Times March 22, 2006



A22 WEDNESDAY, MARCH 22, 2006

## Cars, Trucks Key Culprits in Toxic Air

[Fumes, from Page A1] side and San Bernardino counties are near the U.S. average.

Although a tiny fraction of all

cluded diesel exhaust, which was excluded from the EPA's numbers, and ranked other chemicals as more potent than the

# Public Health Issues

- Air pollution linked to asthma, increased cancer risk, and children's health
  - Children's Health Study showed chronic low lung function due to air pollution
  - Mobile sources contribute to 89% of average cancer risk from air toxics in South Coast Air Basin
- Recent findings indicate State has second highest toxic air concentration



# Advancing Technologies

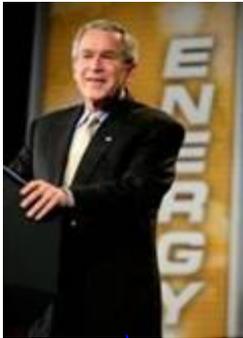
Near-Term

- Aftertreatment
- Emulsified Diesel
- HD Natural Gas Engines
- Natural Gas Fueling Infrastructure
- Hybrid Vehicles (incl. Plug-in)
- Advanced Diesel Engines
- Gas to Liquid Fuel
- Renewables
- H2 Technologies & Refueling
- Fuel Cell Vehicles



Longer-Term

# PHEVs Gaining Attention



Feb



Mar



Apr

May



Jun

Jul

2006



**MPG: Toyota's Katsuki Watanabe tells reporters in Tokyo that the automaker plans to lift its fleet's overall fuel economy.**  
**Toyota to Explore Plug-In Hybrids**

Los Angeles Times  
**latimes.com.**

<http://www.latimes.com/business/la-fi-gm24jun24,1,4356288.story>  
 From the Los Angeles Times

**GM Said to Be Developing 'Plug-In' Hybrid Car**

From Bloomberg News

June 24, 2006

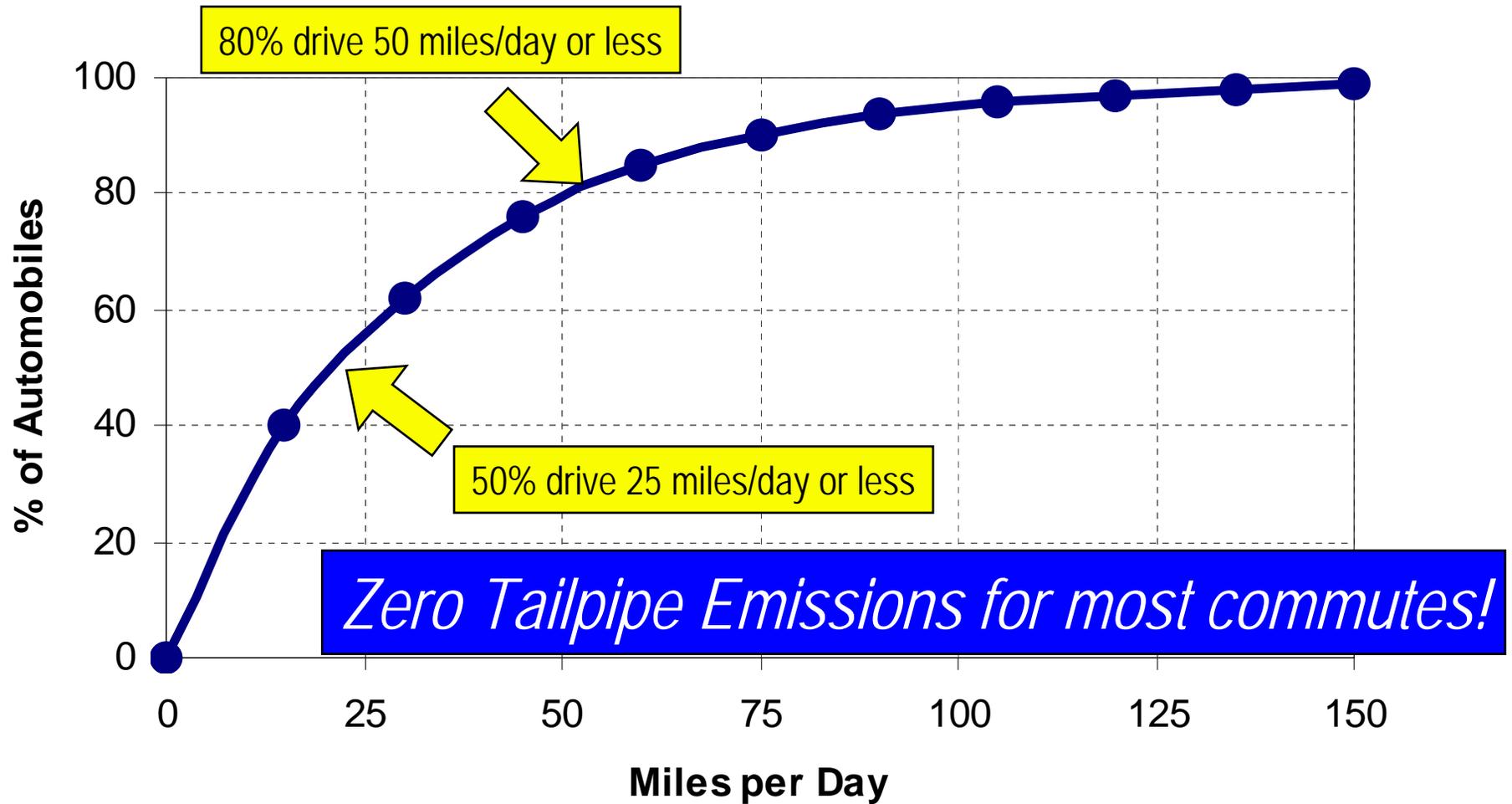


**Addicted to Oil**



Pulitzer Prize-winning reporter Thomas L. Friedman explores ideas for breaking our dependence on oil as an energy source.

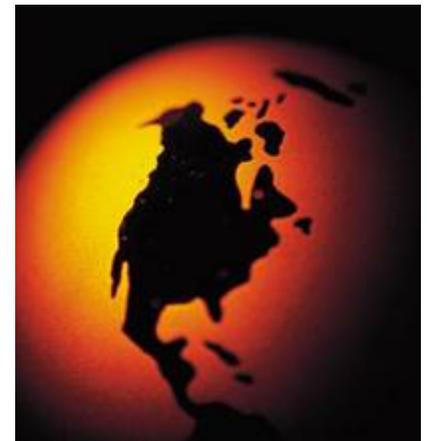
# Average Commuting Distance



Source: D.O.T. Nationwide Personal Transportation Survey 1990

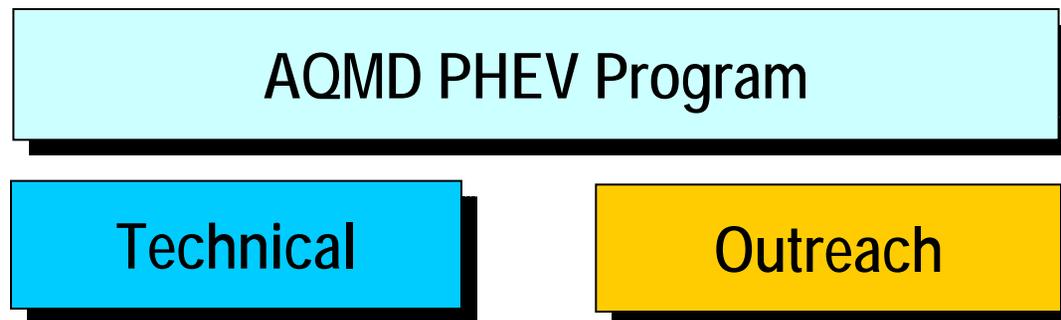
# PHEVs Have Other Compelling Benefits

- Energy Diversity and Petroleum Displacement
- Energy Efficiency and Reduced Greenhouse Gas Emissions



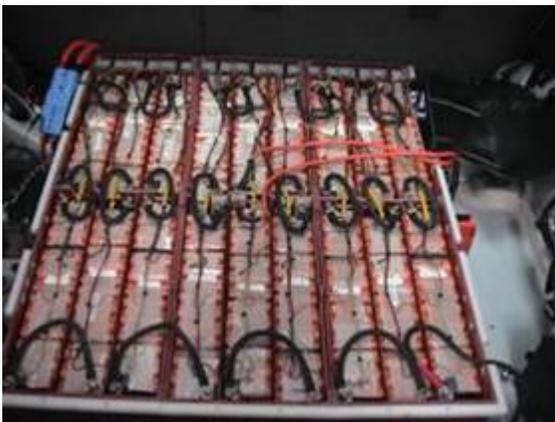
# Develop Research Program to Address Critical Issues

- March 4, 2006, Board directed staff to expand PHEV activities
- April 7, 2006, Board approved staff recommendation for expanded program
  - PHEV Technology Plan
  - PHEV Outreach Plan



# Prius Conversion Plug-in HEV

- AQMD “Shakedown” testing underway
- More than 100 mpg under optimum conditions
- Prototype testing and up to 4 additional demonstration vehicles
- Currently using Valence Lithium-ion batteries



Battery pack



# DaimlerChrysler PHEV

- Phase I
  - AQMD testing 2 delivery vans this year
  - NiMH and Li-Ion batteries
- Phase 2
  - 30 vehicle fleet worldwide (18 in US)
  - AQMD to test 5 passenger vans in fleet service
  - Water-cooled Saft Li-ion batteries



# PHEVs Can be an Enabling Technology

- Very expensive
- Limited H2 storage capability
- No commercial product yet



Fuel Cell Vehicles

- Less \$ than FCVs but
- Storage is still an issue
- H2 is expensive
- Low but measurable emissions



Hydrogen ICEs



H2 PHEVs

- Increased range
- Reduced H2 components
- More mature battery tech
- Even lower emissions

# Collaborate on RDD&D Program to Accelerate Progress

- Need for long-term and near-term solutions
- Need to invest now in research-demonstration technologies
- Public-private partnership
- Collaborative efforts to leverage and accelerate deployment



# Collaborate on RDD&D Program to Accelerate Progress

