

Public Workshop
Technology Assessment on Climate Change Emissions
from Light-Duty Vehicles

Discussion of Results from TIAX Study

April 20, 2004
Sacramento, CA

Alternative Fuel Vehicles

- Impact on climate change emissions
- Well-to-wheels analysis
- Cost and marketability issues
- Technology improvements identified for conventional vehicles not included

Alternative Fuels

- Electricity
- Ethanol
- Compressed Natural Gas
- Liquid Petroleum Gas
- Plug-in hybrid

Electricity

- Large emissions benefit ~ 50 percent
- Marketability and cost issues
- Small city and neighborhood vehicles more viable but have smaller emission benefits

Ethanol

- 35 percent reduction relative to gasoline
- Current flexible fuel vehicles use gasoline due to lack of infrastructure
- Dedicated fuel vehicles necessary to ensure emission benefits

Compressed Natural Gas

- Emissions benefit ~ 30 percent
- Modest refueling infrastructure
- Home refueling key to larger scale commercialization

Liquefied Petroleum Gas

- 30 percent reduction relative to gasoline
- Fleet use in California: 33,000 vehicles
 - central refueling
- Most cost-effective alternative fuel

Plug-in HEV

- ~50 percent reduction relative to gasoline
- 20 - mile all-electric range

CO₂ Comparison

	Total CO2 g/mile	Lifetime Tons	Percent Reduction
Convention vehicle	409	91	0
Electricity	205	48	-50
Ethanol	250	58	-36
CNG	280	65	-28
LPG	275	64	-29
Plug-in HEV	195	46	-50

Incremental Cost

	Cost Increment	Lifetime NPV
Convention vehicle	\$0	\$0
Ethanol	\$0	(\$2,412)
CNG	\$3,600	(\$6,039)
LPG	\$700	(\$3,342)
Plug-in HEV	\$5,700	\$691

Adjustment Factors

Fuel	CO2 Adjustment Factor
<u>Emissions</u>	
CNG	1.03
LPG	0.89
E85, Corn	0.76
<u>Fuels with no direct CO2 Emissions</u>	
Electricity, Grid NG	643 g/kWh

Staff Conclusions

- Alternative fueled vehicles available in limited quantities
- Substantial reductions in climate change emissions possible from wider use
- Incremental costs and fuel availability hurdles to commercialization