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California Experience in Converting Vehicles to Alternative Fuels

New Delhi, India
May 2001



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



Air Resources Board

Today's Agenda

- ✦ **Background**
- ✦ **Programs for Conversions**
- ✦ **New Projects**
- ✦ **Summary**

Background

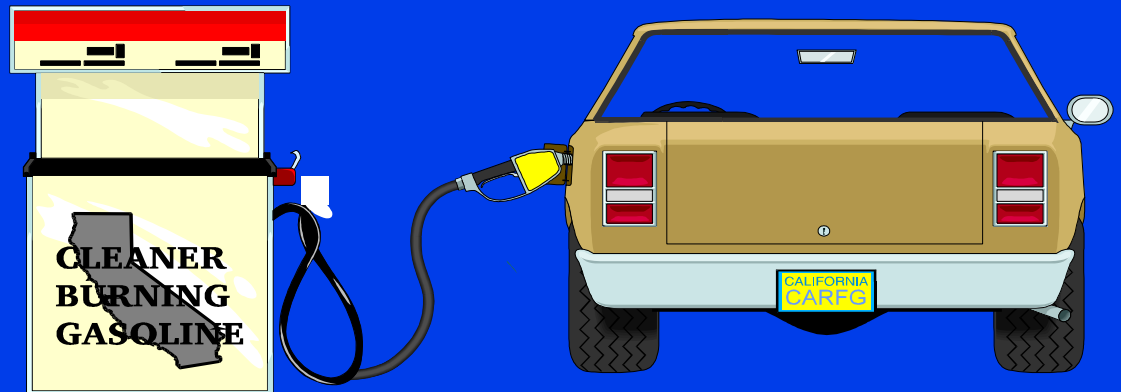
✦ Motor Vehicle Fuels Control Strategy

✦ Treat vehicles / fuels as a system

- ✦ Vehicle emission standards

- ✦ Fuel standards

✦ Flexible



CA Fuel Programs

Adopted	Gasoline	Diesel	Alternative Fuel
1971	Reid Vapor Pressure Bromine Number	--	--
1975	Sulfur & Manganese & Phosphorus	--	--
1976	Lead	--	--
1981	--	Sulfur (SCAB)	--
1982	Lead	--	--
1988	---	Sulfur & Arom. HC	---
1990	Phase 1 RFG	---	Clean Fuels & LEV
1991	Phase 2 RFG	---	---
1991	Winter Oxygenates	---	---
1992	---	---	Commercial & Cert. Specs.
1994	Phase 2 RFG Predictive Model	---	LPG (amend)
1998	Combustion Chamber Deposits (amend)	---	LPG (amend)
1998	Winter Oxygenates (amend)	---	---
1999	Winter Oxygenates (amend)	---	Clean Fuels (amend)
2000	Phase 3 RFG (no MTBE)	---	---

Background

- ▶ **PM and NOx emissions of new CA engines reduced at least 63% since 1998**
- ▶ **However existing diesel engines produce most of inhalation cancer risk (diesel exhaust identified as TAC in 1988)**

Background

Board Action

- ✦ August 1998, the Board listed particulate matter emissions from diesel-fueled engines as a toxic air contaminant.
- ✦ October 2000, the Board approved the diesel risk reduction plan.

Diesel Risk Reduction Plan

- ✦ Diesel PM represents about 70% of statewide cancer risk from Toxic Air Contaminants.
- ✦ Comprehensive strategy to reduce diesel PM emissions from new and existing vehicles and engines.
- ✦ Advised by International Diesel Retrofit Advisory Committee.
- ✦ Retrofits of existing vehicles and engines are a major component of plan.
- ✦ Includes low sulfur (15 ppm Max) diesel fuel for on- and off-road vehicles and engines.
- ✦ Goal is a 75% reduction in emissions by 2010 and an 85% reduction by 2020.

Programs

Funding

**Over \$120 MILLION DOLLARS AVAILABLE
FOR PROJECTS in 2001**

- ✦ **Usually a purchase of new vehicles**
- ✦ **Now includes PM & NOx retrofits**

Local Programs

- ✦ **Carl Moyer**
- ✦ **Heavy Duty Engine Emission Reduction Incentive Program. Fund incremental costs of heavy-duty clean fuel engines.**
- ✦ **(MSRC) Alternative Fuels Match Program**
- ✦ **Lower-Emission School Bus Program**

Carl Moyer Program

Carl Moyer Program Types and Number of Engines Funded Statewide Years I & II

Source Category/ Equipment Type	Number of Engines		Total Funds	
	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:				
Heavy-Duty Line Haul		29	-	\$ 712,950
Refuse Haulers	200	38	\$ 9,374,303	\$ 268,111
Urban Transit Buses	329		\$ 6,626,959	-
School Buses	12		\$ 315,640	-
Other	41	8	\$ 1,732,567	\$ 141,524
Off-Road Equipment:				
Farm Equipment		25	-	\$ 240,915
Construction		1	-	\$ 4,352
Other	12	7	\$ 174,745	\$ 108,070
Locomotives:	2		\$ 820,000	-
Marine Vessels:		95	-	\$ 6,067,346
Agricultural Irrigation Pumps:	14	947	\$ 179,551	\$ 9,852,940
Forklifts (electric):	105		\$ 1,482,000	-
Total	715	1150	\$20,705,765	\$17,396,208

Carl Moyer

- ✦ Heavy Duty Line Haul
- ✦ Refuse Haulers
- ✦ Urban Transit Buses & School Buses
- ✦ Locomotives & Marine Vessels
- ✦ Irrigation Pumps
- ✦ Forklifts (electric) & Alt Power Units

Urban Transit Bus Regulation

- ✦ **New low NOx and PM emission standards and a fleet rule**
- ✦ **Transit buses ideally suited for alt fuels**
 - ✦ **in urban areas with poor air quality**
 - ✦ **centrally-fueled and maintained**
 - ✦ **purchases heavily subsidized**
 - ✦ **air quality incentive funds available**

Diesel and Alt-fuel Compliance Path

- ✦ Voluntary purchase of cleaner alt-fuel buses
- ✦ Combination of requirements
 - ✦ in-use NOx fleet average
 - ✦ PM retrofit
 - ✦ low-sulfur diesel fuel (15 ppm sulfur)
 - ✦ low-emission bus purchase
 - ✦ zero-emission bus demonstrations

Alternative-Fuel Path

- ✦ **Alternative-Fuel path provides immediate NOx reductions and greater overall PM reduction**
- ✦ **18 transit agencies already using alternative fuels**
- ✦ **85% of new purchases must be alternative-fuel**

Zero Emission Bus (ZEB) Requirements

✦ Demonstrations in 2003

- ✦ Applies to large transit agencies (>200 buses) on diesel path.

- ✦ 3 ZEBs demonstrated in each fleet

✦ 15% of new bus purchases

- ✦ from 2008-2015 for diesel path

- ✦ from 2010-2015 for alternative-fuel path

Summary

▲ Future Revisions:

- Provide flexibility
- Expand the program
- Ensure benefits are real, quantifiable, and enforceable

Summary

- ▶ **New PM & NOx requirements, goals, and baselines with 15PPM diesel**
- ▶ **Local matching fund requirement**
- ▶ **Review new project with respect to categories & criteria**
- ▶ **Continuing review of technology**

Summary

- ✦ Evaluate emissions of dual fuel engines in stop & go applications
 - ✦ If necessary, determine appropriate emission discount based on alternative fuel use
- ✦ Continue to support efforts to identify additional program funding