



Transit Bus Fleet Rule Implementation Update

November 8, 2001

California Environmental Protection Agency



Air Resources Board

Today's Presentation

- Requirements for 2002
 - ▶ Reports Due 1/31/02
 - ▶ Low Sulfur Fuel
 - ▶ NOx Fleet Average
 - ▶ Retrofit
 - ▶ Alternative NOx Strategy Applicants
- Board Direction from September Meeting

Reports Due in 2002

For 2001

2002: Reporting Requirements

- Reports Due by January 31, 2002 for 2001
- Annual Report:
 - ▶ Number, Engine Make/Model, Engine Model Year For All Engines in Buses, and Fuel Used
 - ▶ Note Purchases/Leases
 - ▶ Percentage of Purchases/Leases of Alt. Fuel Buses

2002: Reporting Requirements (Cont'd)

- **PM Retrofit Initial Report**
 - ▶ Tier 1 & Tier 2 Buses (- 1995 MY)
 - ▶ Number, Engine Make/Model, Model Year of Diesel Buses and Projected Date of Retrofit
 - ▶ Projected Exempted Buses and Rational

Actions Required in 2002 By Transit Agencies

2002: Low-Sulfur Diesel Fuel

- Use Low Sulfur Diesel Fuel
 - ▶ <15 parts per million (ppm) Sulfur
 - ▶ July 1, 2002
- Small Transit Agencies (<20 buses) in 1-hr Ozone Attainment Areas Comply by July 1, 2006

2002: NOx Fleet Average

- Achieve NOx Fleet Average
 - ▶ Applies to all transit agencies
 - ▶ 4.8 g/bhp-hr NOx
 - ▶ October 1, 2002
- Compliance Options
 - ▶ Apply by 1/31/02 to include ZEBs that are not “urban buses” in calculation
 - ▶ May Retire All Pre-1987 Buses

2002: PM Retrofit

- Retrofit Diesel Buses Using ARB-Verified 85% Devices
- Tier 1 (pre-1991): 100% by 1/1/2003
- Tier 2 (1991-1995):
 - Diesel Path - 50% by 1/1/2003
 - Alt-Fuel Path - 20% by 1/1/2003

PM Retrofit Schedule Diesel Path

Tiers	2003	2004	2005	2006	2007
Tier 1 Pre-1991	100 %				
Tier 2 1991 - 1995	50 %	100 %			
Tier 3 1996 - 2002			20 %	75 %	100 %

Note: Percentages of retrofit requirements must be met by January 1 of each year.

PM Retrofit Schedule Alternative Fuel Path

Tiers	2003	2004	2005	2006	2007	2008	2009
Tier 1 Pre-1991	100 %						
Tier 2 1991 - 1995	20 %	75 %	100 %				
Tier 3 1996 - 2002					20 %	75 %	100 %

Note: Percentages of retrofit requirements should be met by January 1 of every year.

2002: PM Retrofit (Cont'd.)

- Exemptions
 - ▶ Pre -1991 Buses Already Retrofitted to 0.10 g/bhp-hr are Exempt
 - ▶ Retirement Exemption
 - Alternative Fuel Path: Tier 2 buses within two years of retirement
 - Diesel Path: Tier 2 buses within one year of retirement

2002: PM Retrofit (Cont'd.)

- Delays
 - ▶ Agencies with <20 Buses in 1-Hr. Ozone Attainment Districts May Delay 100% Implementation to 1/1/2007

2002: PM Retrofit (Cont'd.)

- Delays
 - ▶ If No Verified Retrofit Device is Available 6 Months Prior to Dates, Agency May Apply for 1-Year Delay, Subject to Approval
 - ▶ Must Retrofit All Buses That Can Be Retrofitted, Up to Applicable Percentage Required Each Year, Before Applying For Delay

Alternative NOx Strategy

Applies to 15 Transits

2002: Alternative NOx Strategy

- “The Executive Officer may exempt transit agencies on the diesel path from the requirements” of 1956.2 (d)(4) provided that:
 - ▶ (1) The Transit Agency applies to the EO by June 30, 2001.
- **Only Transit Agencies That Applied By June 30 Are Eligible**

2002: Alternative NOx Strategy

- ▶ (2) Final Date For Plan Approval Is
12/31/2001 (extension granted by Board)
- ▶ (3) Advanced NOx Aftertreatment
Demonstration
 - **Commit Resources by 12/31/2001**
 - **Demonstration in Progress by 12/31/2002**

Board Directives to Staff

**September 2001
Meeting**

Directions from Board September 2001

- Report Back **March 2002** on Progress by Engine Manufacturers and Transit Agencies on the Diesel Path Towards Achieving Advanced Diesel Bus Engine Technology
- Prepare to Eliminate Diesel Path Option if Efforts Towards Clean Technology and Compliance Do Not Improve

Directions from Board September 2001

- Continue to Work with Transit Agencies That Have Not Yet Complied with Reporting Requirements on NOx Fleet Average
- Transit Agencies That Applied For Alternative NOx Strategy Exemption Granted Additional Time to Comply

Directions from Board September 2001

- Work with Small & Rural Agencies on Establishing Alternative-Fuel Infrastructure
- Hybrid-Electric Bus Test and Certification Procedures by Mid-2002

ARB Website :

arb.ca.gov/msprog/bus/bus.htm

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Hybrid Bus Test Procedure

Update

Hybrid Electric Buses

- ◆ **Hybrid design incorporates a Renewable Energy Storage System (RESS)**
- ◆ **RESS allows for a smaller engine = improved fuel economy**
- ◆ **Stop-&-Go duty cycle ideal for regenerative braking typical of hybrid systems**
- ◆ **Lower fuel consumption and emissions**

Issues with Current Procedures

- ♦ **Heavy-duty engines are certified using engine-only dynamometer**
- ♦ **Current procedures do not evaluate complete emission benefits of the hybrid system**

Issues with Current Procedures (continued)

- ♦ **Current procedures not appropriate for hybrid systems because:**
 - **Hybrid engine is typically smaller than comparable diesel-only engine**
 - **Hybrid system operates within a narrower power-demand range**

Current Work

- ♦ **ARB working with Northeast Advanced Vehicle Consortium (NAVC) on J1711-HD**
 - **Staff is identifying drive schedules that represent actual in-use driving**
 - **Staff working with industry representatives to understand hybrid system challenges**

Current Work (continued)

- ♦ **Staff is conducting chassis tests on Hybrid-Electric Buses in California through 1/2002**
 - **Orange County Transportation Authority New Flyer and Torrance Transit Orion complete**
 - **Two test cycles - Central Business District (CBD) and Urban Dynamometer Driving Schedule (UDDS)**
- ♦ **NAVC Tested Orion-LMCS diesel hybrid following the NY City Bus Cycle**

Current Work (continued)

- ◆ **Staff is also evaluating chassis test results for other urban buses to conduct engine-to-chassis emission comparison**
- ◆ **Staff working with industry to evaluate system durability**

Status of Test Procedures

- ◆ **ARB's test procedures based on J1711-HD**
- ◆ **Test procedures could be developed as:**
 - **A method for determining Incentive Funds**
 - **Interim Procedures For Certification - need full evaluation of system durability**
- ◆ **Interim Procedures to Board in fall 2002**

Contact Information

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