

Zero Emission Bus Regulation



California Air Resources Board
Mobile Source Control Division

Proposed Amendments

October 19, 2006

Overview



- ◆ Fleet Rule for Transit Agencies
- ◆ Status
- ◆ Proposal

Fleet Rule for Transit Agencies

- ◆ New engine standards
- ◆ In-use fleet emission standards (retrofit, upgrade)
- ◆ ZBus regulation
 - ▼ Demonstration
 - ▼ Purchase Requirements
 - ▼ Reporting Requirements
 - ▼ Early Implementation Credits

Demonstration Requirement

- ◆ Diesel Path transit agencies only
 - ▼ > 200 buses
 - ▼ 5 agencies affected
 - ▼ 2 demonstrations
 - ▼ 6 fuel cell buses total
 - ▼ Service started
 - February 24, 2005 (VTA/SamTran)
 - March 13, 2006 (AC Transit/GG)
- ◆ Final report by July 31, 2007

Demonstration Participants

Transit Agency	Bus Type
Required Demonstration	
San Francisco Municipal Railway	Electric Trolley
Santa Clara Valley Transportation Authority San Mateo County Transit District	Fuel Cell Bus (3)
Alameda/Contra Costa Transit Golden Gate Transit	Hybrid – Fuel Cell Bus (3)
Voluntary Demonstration	
SunLine Transit	Hybrid – Fuel Cell Bus (1)

Purchase Requirements

◆ ZBus purchase requirements

▼ Diesel Path

- ▶ Agencies with > 200 buses
- ▶ 15% 2008-2015

▼ Alternative-Fuel Path

- ▶ Agencies with > 200 buses
- ▶ 15% 2010-2015

Affected Transit Agencies

(Purchase Requirement)

Transit Agency	Fuel Path	1/1/2005 Inventory
Alameda/Contra Costa Transit	D	672
Santa Clara Valley Transportation Authority	D	531
San Mateo County Transit District	D	347
Golden Gate Transit	D	221
San Francisco Municipal	D	893
Los Angeles County MTA	A	2563
Orange County Transportation Authority	A	612
San Diego Metropolitan Transit System	A	451
Foothill Transit	A	306
Sacramento Regional Transit District	A	253

Status of Technology



Performance Parameters

- ◆ Cost - bus and maintenance
- ◆ Reliability
- ◆ Availability
- ◆ Fuel economy
- ◆ Maintenance
- ◆ Durability/Warranty
- ◆ Infrastructure

Current Status*

- ◆ Fuel cell buses are feasible but not yet commercial
 - ▼ On-road performance – successful
 - ▼ Public Response – positive
 - ▼ Bus Cost – higher than anticipated
 - ▼ Reliability – not adequate
 - ▼ Availability – 25% less than diesel
 - ▼ Fuel Economy – approximately equal to much better
 - ▼ Maintenance – significantly greater
 - ▼ Durability/Warranty – improvement needed
 - ▼ Infrastructure Costs – significantly higher

* Based primarily on initial VTA/SamTrans data

Proposed Amendments



- ◆ Advanced Demonstration (new)
- ◆ Purchase Requirements (delay)
- ◆ Performance Criteria* (new)

* 15 day change

Advanced Demonstration

- ◆ Proves commercial viability
- ◆ Establishes progress toward commercialization
- ◆ Builds customer acceptance
- ◆ Buses count towards purchase requirement
- ◆ Initial demonstration buses can be used, if upgraded*

* 15 day change

Advanced Demonstration (Continued)

- ◆ Single or Multi-Transit Agency Option
- ◆ Diesel-Fuel Path
 - ▼ Demonstration Required
 - ▼ Starts in 2009
- ◆ Alternative-Fuel Path
 - ▼ Demonstration Optional
 - ▼ Starts in 2010
 - ▼ Delay purchase requirement by one year (2012)
 - ▼ Compliance option
 - ▶ Allow near zero emission buses if using zero emission enabling technology

Advanced Demonstration (Single or Multi Transit Agency Option)

- ◆ Single Transit Agency Option
 - ▼ 6 ZBuses per demonstration
- ◆ Multi Transit Agency Option
 - ▼ 12 per demonstration minimum
 - ▼ 3 per transit agency minimum

Purchase Requirement

15 Percent of new bus purchases

Fuel Path	Year	
	Current	Proposed
Diesel	2008 - 2015	2011 - 2026
Alternative Fuel	2010 - 2015	2011 - 2026 or 2012* - 2026

* If in Advanced Demonstration

Performance Criteria*

Purchase Requirement	15%
Initial Cost FCB¹	\$1 Million
Durability² (hours)	20,000
Reliability³ (miles)	10,000

* 15-Day Change

1 Based on 1.25:1 ratio of Electric Trolley to FCB cost

2 Durability or manufactures warranty

3 Miles between propulsion related road calls

OTHER AMENDMENTS AND MODIFICATIONS

- ◆ Extend credits for early implementation
- ◆ Extend inventory reporting requirement
- ◆ Require quarterly updates for demonstration*
- ◆ Include lightweight urban buses

*15-day change

Short-Term Emission Effects (Tons Per Year)

	NOx	PM	CO	HC
2010	(2.15)	(0.081)	(2.21)	(0.053)
2015	(2.21)	(0.084)	(2.29)	(0.055)

- ◆ Comparison between current regulation and proposed regulation
- ◆ Represents loss of benefit in emission reduction

Long Term Emission Effects (Tons Per Year)

	NO _x	PM	CO	HC
2023	22	1.3	38	0.9

- ◆ Comparison between proposed regulation and no ZBus regulation

15 Day Changes



- ◆ Board to determine commercial readiness
- ◆ Repowered buses count towards advanced demonstration

Issues

Purchase Requirement Start Date

- ◆ **Timeline for purchase requirement**
 - ▼ **Do not delay of purchase requirement – fuel cell providers**
 - ▼ **Delay proposed purchase requirement for Alternative Fuel Transit Agencies**

Summary of Staff Proposal

- ◆ Additional Demonstration
- ◆ Delay Purchase Requirement
- ◆ Include Implementation Criteria
- ◆ Modify Early Implementation Credits
- ◆ Modify Reporting Requirements