Zero Emission Bus Regulation Overview & Next Steps

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1

Zero Emission Bus (ZBus) Regulation

- Adopted in 2000 under Transit Fleet Rule
- Amended twice (2004, 2006)
- Purchase requirement on hold (2009 mailout)
- ZBus is a Battery Electric, Electric Trolley, or Fuel Cell Bus
- Fuel cell technology was the focus

2

Current Regulatory Elements

- Affects only large agencies
  - (>200 Urban Buses)
- ZBus Demonstrations
  - Diesel Path Only
  - Initial (2 demos, 2 TAs each, 3 buses) 2005-2007
  - Advanced (1 demo, 5 TAs, 12 buses, 2 fueling stations) 2010- current
- 15% ZBus purchase requirement (on hold)
  - 2011 for Diesel Path Transit Agencies
  - 2012 for Alternative Path Transit Agencies

3

Large Transit Agencies

Transit Agency	Total # Urban Buses	Fuel Path	15% of Annual Purchases
Los Angeles Metro	2651	CNG	33
San Francisco Muni	800	Diesel	0
Orange County Transportation Authority	626	CNG	8
Alameda-Contra Costa Transit	487	Diesel	6
San Diego MTS	465	CNG	6
Santa Clara Valley Transportation Authority	420	Diesel	5
Foothill Transit	300	CNG	4
San Mateo County Transit	293	Diesel	4
Sacramento Regional Transit	221	CNG	3
Long Beach Transit	218	Alternative Fuel	3
Golden Gate Transit	202	Diesel	3
Santa Monica Big Blue Bus	186	Alternative Fuel	0
Omnitrans	153	Alternative Fuel	0

Total Annual Purchase = 74 Buses

4

Remaining Issues

- Cost
- Technology availability
- Need for commercial scale production runs
- ZBus project data collection and public sharing
- Established bus OEM involvement
- Infrastructure

5

DOE FCB Targets

	2016 Target	Ultimate Target
FCB Purchase Cost	$1,000,000	$600,000
Power Plant Cost	$450,000	$200,000
Power Plant Lifetime	18,000 hours	25,000 hours
MBRC-Bus/ FC System	3,500 / 15,000 miles	4,000 / 20,000 miles
Bus Availability	85%	90%
Bus Maintenance	$0.75/mile	$0.40/ mile
Hydrogen storage	$75,000	$50,000

Bus Lifetime 12 years and 500,000 miles, Range of 300 miles/day, Operation 20 hours/day, 7 days/week, Fuel Economy 8 miles per DGE

6

ZBus Regulation Still Important

* Inventory of ROG and NOx
* Green House Gas
* Localized Impacts
* Technology Transfer to other Heavy Duty Sectors

Pollutant	TPD
ROG	2.29
TOG	2.54
CO	16.28
NOx	34.72
CO2 (Pavley & LCFS)	5459
PM10	2.26
PM2.5	1.24

EMFAC2011,
calendar year 2013, Transit Buses (UBUS)

7

Principles

* Commercialization of Zero Emission Buses and Transformation of Transit Fleets
* Applied to Transit Buses
* Zero Emission Components (Miles)

8

Regulation Process

* Technology Assessment
* Stakeholder meetings
* Workshops (September, November)
* Proposal development
* Stakeholder meetings as necessary
* Additional workshops as necessary
* Board Hearing May 2014

9

First Workshop (Technology Summit)

* Lay out goals of the regulation
* Technology Summit – Invited technology providers present feasible technology pathways
* Panel Discussions
  * Battery Electric Bus
  * Fuel Cell Electric Bus
  * ZBus Infrastructure
  * Real World Experience with ZBuses

10