Status of California's School Bus Fleet

December 8, 2016

California Environmental Protection Agency

Air Resources Board

Overview

June 2016 Board directed staff to provide an update on ‘dirty’ school buses and funding available

- History of ARB’s school bus programs
- Population and funding update
- Challenges and next steps

Particulate Matter Affects Children's Health

- Children's Health Study (1992)
  - Reduced lung development with exposure to higher concentrations of particulate matter (PM)
  - Permanent adverse respiratory health effects later in life
- Children's School Bus Exposure Study (2003)
  - Pollution levels inside school buses are greatly affected by the bus' own exhaust (self-pollution)
  - Cleaner school buses have lower in-vehicle exposure
- Mitigation Studies

ARB's Regulations Reduce Children's Exposure

Goal: Reduce children's exposure to vehicle-related pollutants during commute to school by school bus

- Require particulate matter exhaust filter (PM filter) or reduced mileage
- Restrict school bus idling
- Require routine smoke tests

ARB & Air Districts Continue to Invest in School Bus Clean-Up

Funding Source	Amount	Projects Funded
Lower Emission School Bus Program *since 2001*	$310 M	7,456 retrofits 1,642 replacements
Federal Diesel Emissions Reduction Act (DERA) *since 2008*	$12.6 M	549 retrofits 78 replacements
Supplemental Environmental Project (SEP) *since 2011*	$218,000 *of $4.5 M to date*	6 retrofits, 2 replacements, replace 340 recalled filters
Local Programs – AB 923 ($2 DMV Fee) *2008-2016*	$160 M	retrofits, replacements, CNG tanks and infrastructure
Zero-Emission Bus Pilot Commercial Deployment Project *2017 Low Carbon Transportation Investments*	$7.5 M	Funds 29 zero-emission battery electric school buses in 3 school districts

Several Factors Shape School Bus Emissions

- **Age**
  - Older buses emit more PM
- **Presence of PM filters**
  - PM filters reduce PM emissions by more than 85%
- **Annual mileage**
  - Spare buses drive less, so emit less PM

Information Sources Used to Develop Emissions Picture

- Main Source: **2014 CHP School Bus Inspections**
  - Most complete since buses inspected annually
  - No annual mileage or retrofit info
- Prop 1B Retrofits & Replacements (2008-2014)
- Local Air District Funding Lists
- Carl Moyer Funding
- 2016 TRUCRS (voluntary)
- 2015 DMV School Bus Registration Data
- 2016 School Bus Fleet Survey

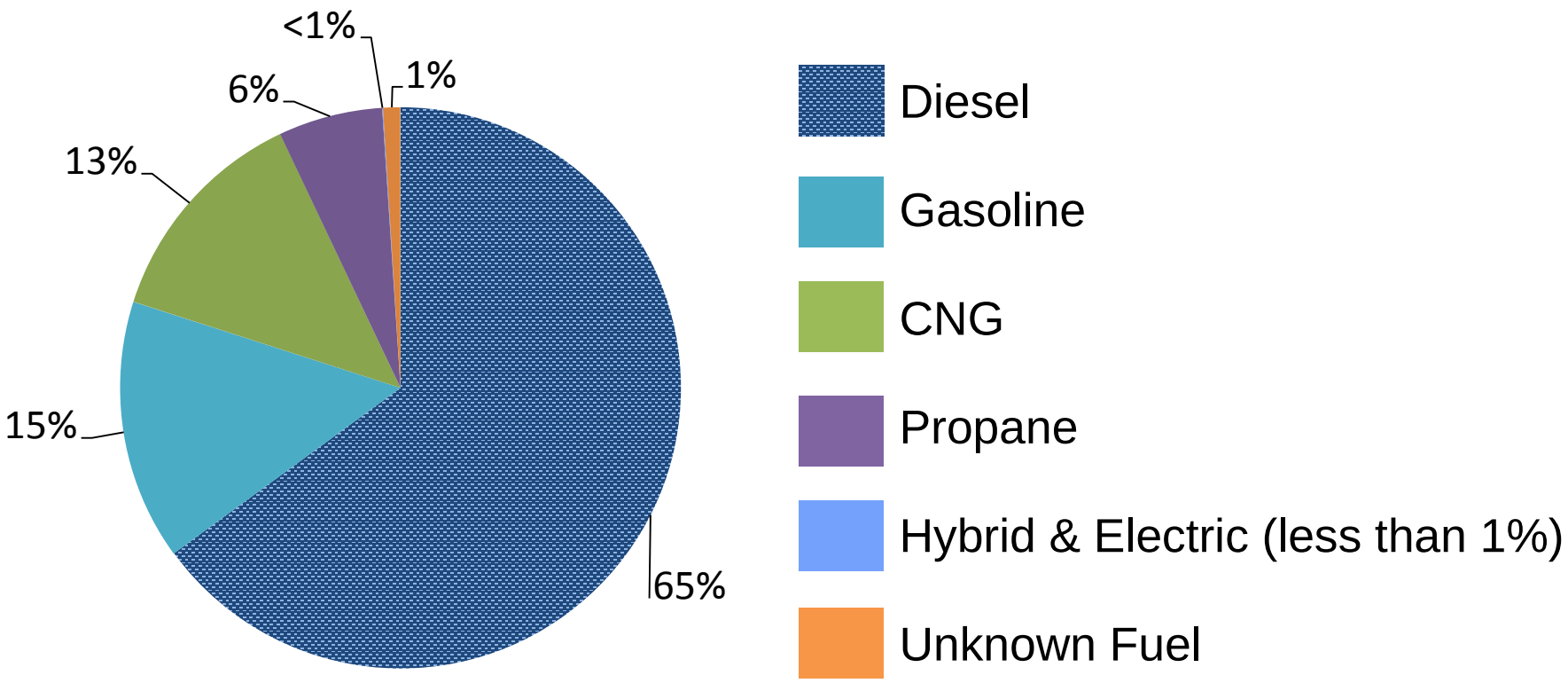
2016 School Bus Fleet Survey

- August 2016
  - ARB, CASTO, & School Transportation Coalition
  - Distributed to school districts and school bus fleets
- Approximately 250 surveys completed totaling approx. 7,200 school buses
  - Survey responses continue to come in

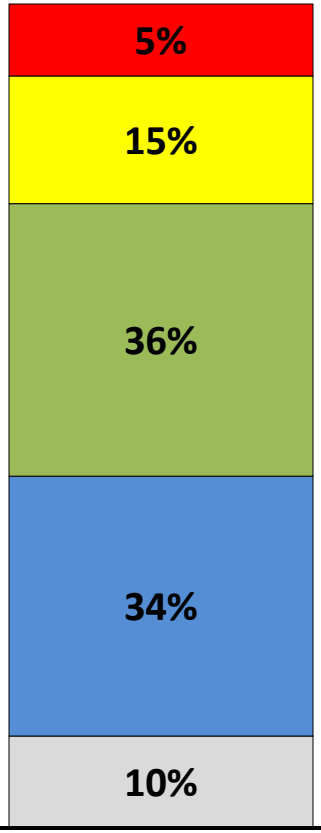
Collaboration with School Bus Partners

- Public Workshop
  - November 4, 2016
- Ongoing one-on-one conference calls and meetings with stakeholders
  - Air Districts, CAPCOA
  - School Districts
  - School Bus Sales/Retrofit Installers
  - Associations (CA Association of School Transportation Officials, Small School District Association, CA School Boards Association, etc.)

CA School Bus Population by Fuel Type
Approx. 25,400 School Buses



CA School Bus Population (estimated)



- Diesel, >14K GVWR, no PM filter
- Diesel, > 14K GVWR, low use and oldest with PM filter, <14K lbs. GVWR and no PM filter
- Diesel with PM filter
- Gasoline, Natural Gas, Propane, Hybrid, or Electric
- Need additional info

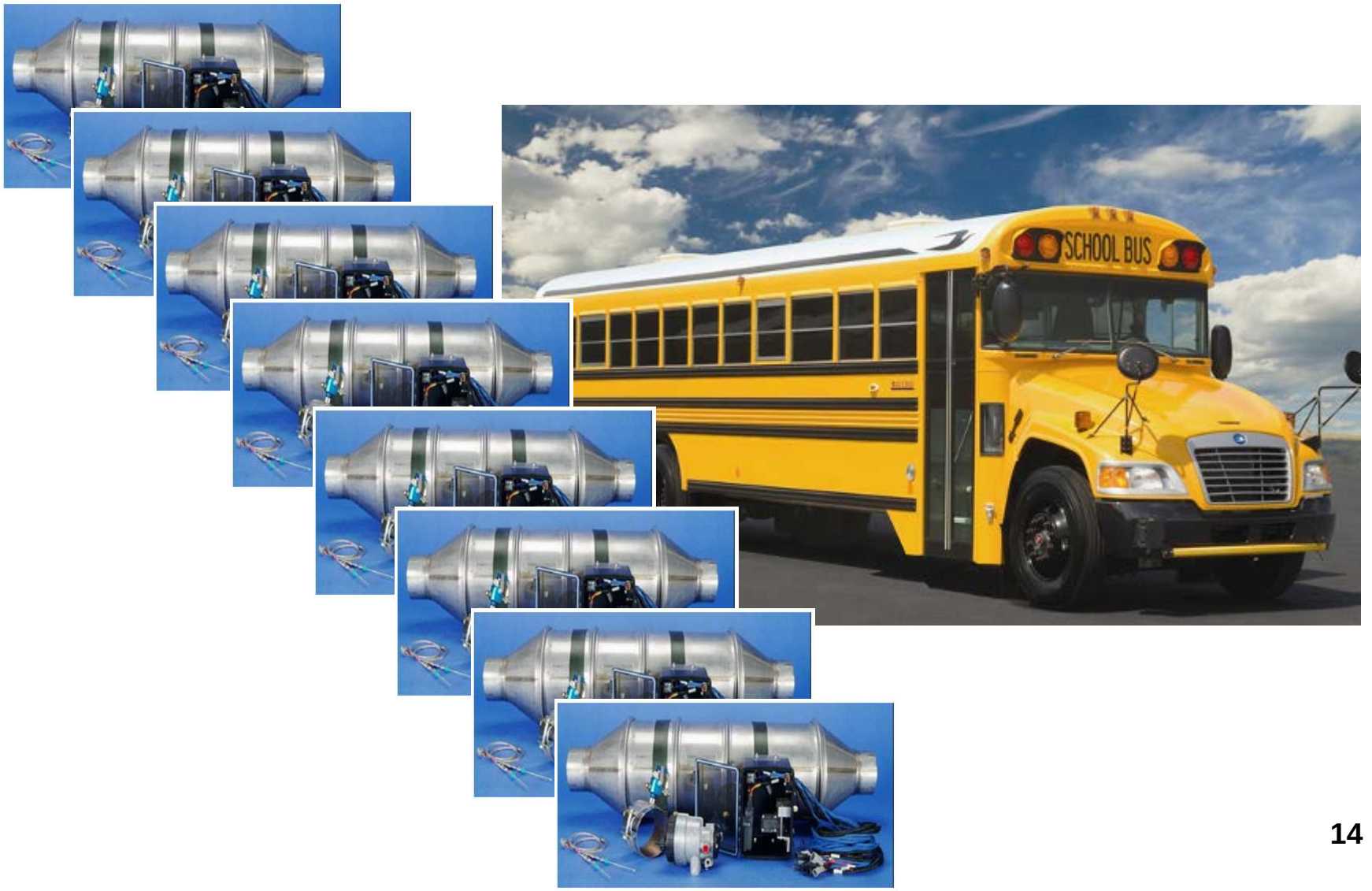
Key Points from School Bus Data

- Collectively, California has made great strides to ensure kids ride clean school buses
- 20% of the total population includes immediate and upcoming priority school buses
- Statewide issue ranging throughout urban and rural areas of California
- ARB must continue to encourage school districts to meet clean-air requirements

Estimated School Bus Project Costs

Category	Approx. price per bus
Retrofit PM Filter	$20,000
Diesel - Less than 14,000 lbs.	$70,000
Propane Conventional - Type C 75 Passenger	$130,000
Diesel Rear Engine - Type D 81 Passenger	$165,000
CNG Rear Engine - Type D 81 Passenger	$185,000
Battery Electric Zero-Emission	$225,000 - $400,000

The Cost of Eight Retrofits = One Replacement



Some Potential Funding Sources for School Buses – *each have stipulations*

Funding Source	Funding Amount	Retrofits and/or Replacements	Advanced Technology*	Primarily for School Bus Projects
Supplemental Environmental Project (SEP)	varied	X	X	
Volkswagen Settlement: Appendix D Mitigation Funds	$381M			
LCTI - Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)	$18 M		X	
LCTI - Rural School Bus Pilot Project	$10 M	X	X	
Carl Moyer Program	~$60 M** $6.5 M	X	X	
Local District Funding (*AB 2766, AB 923, etc.*)	~$230 M**	X	X	
Other Federal & State Funds (*DERA, CEC, etc.*)	varied	X	X	

** Zero-Emission, Hybrid, or Low NOx* ***Air district discretion*

School Bus Clean Up Priorities

~5% Immediate

~15% Upcoming

		Minimum Number of School Buses	Estimated Clean Up Cost
1	Uncontrolled School Buses	590	$72M
2	Non-Compliant School Buses	670	$98M
3	Approaching useful life	3,800	$388M
		5,060	$558M

Immediate Priority

		Minimum Number of School Buses	Estimated Cleanup Cost
1	Uncontrolled School Buses	590	$72M

Includes:

- Recalled PM filters and No PM filter technology available

Next Steps:

- Utilize existing school bus SEP (Approximately $4.5M)
- Encourage air districts to fund replacements
- Encourage school districts to apply for funding

Immediate Priority (continued)

		Minimum Number of School Buses	Estimated Cleanup Cost
2	Non-Compliant School Buses	670	$98M

Includes:

- School buses that should have been replaced or filtered

Next Steps:

- Work with air districts and school districts to clean up these high emitting school buses and pursue enforcement action where necessary.

Upcoming Priority

		Minimum Number of School Buses	Estimated Cleanup Cost
3	Approaching Useful Life	3,800	$388M

Includes:

- Filtered 1994 & older, low use, and unfiltered less than 14,000 lbs. GVWR

Next Steps:

- Support school transportation advocates to secure school bus funding

Challenges

- School transportation is generally underfunded
- School districts and air districts have multiple funding priorities
- Not all air districts collect DMV fees (local funding)
- SEP funding is variable and not guaranteed

Next Steps

ARB Staff will continue to:

- Educate school bus officials on compliance requirements, available funding, and leveraging opportunities
- Support School Bus SEPs
- Enforce the Truck and Bus Regulation
- Promote cleaner technologies to accelerate transformation of the school bus fleet
- Foster peer-to-peer knowledge-sharing of technology
- Identify opportunities to apply LCTI funding for school buses

Next Steps with Partners

- Work with CAPCOA to match local needs with options
- Work with VW beneficiary and others to assess funds for school buses
- Support school transportation advocates as they work to secure school bus funding
- Support new and sustained funding sources for clean school buses

Thank you