



# State of Alternative Bus Fleet Fuels Audience November 13, 2018



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# Transit Bus Inventory

- **Current U.S. Public Transit Bus Inventory**
- **Diesel Buses Dominate the Market but Numbers are Declining**
- **16.9% Hybrid Electric**
- **16.7% CNG**
- **Other Alternative Fuel Vehicles are Less Than 1%**

Source -2015 American Public Transit Association (APTA) Report on Alternative Fuels



# CATS – Current Fleet

- **295 Fixed Route Buses**
- **38 Hybrid Electric Buses**
- **257 Diesel Fuel Buses**
- **CATS 5 year Capital Program includes \$66 million to replace up to 120 buses**
- **CATS bus replacement program – 80% federal funds/20% local funds (sales tax)**
- ***85 Special Transportation Service (STS) vehicles***



# Electric Bus Market

- **Manufacturers of Electric Buses for U.S. Market**
- **Build Your Dream BYD –Headquarters in China. Bus Built in Lancaster CA. Major Supplier of Electric Buses Globally.**
- **Proterra –U.S. Based Company, Bus Built in Greenville, South Carolina. Major Supplier in U.S. Market**
- **New Flyer –Headquartered in Canada**
- **Nova –Headquartered in Canada**



# HART -Current Fleet

- **191 Fixed Route Buses**
- **35 CNG in Service**
- **25 CNG Buses Arriving**
- **CNG -Lower Operating Costs**

<b>Bus Type</b>	<b>Maintenance Costs</b>	<b>Fuel Costs</b>	<b>Total - Cost per Mile</b>
<b>Diesel</b>	<b>.24</b>	<b>.47</b>	<b>.71</b>
<b>CNG</b>	<b>.10</b>	<b>.29</b>	<b>.39</b>



# CNG – Electric Bus Comparison

- **“Foothill Transit Battery Electric Bus Demonstration Results”**
- **Conducted by the National Renewable Energy Laboratory –U.S. Department of Energy, January 2016**
- **Comprehensive Operating and Capital Cost Comparison of CNG verses Electric Buses at Foothill Transit, in Los Angeles, CA.**
- **Study Included 12 Proterra Electric Buses and 8 NABI CNG Powered Buses**
- **Conducted April 2014 through July 2015**



# CNG – Electric Bus Comparison

## Study Findings:

Description	Electric Bus	CNG Bus
Fuel Economy – DGE/MPG	17.48	4.51
Miles Between Road Calls	9,331	45,547
Bus Purchase Price	\$904,490	\$575,000
Maintenance Cost per mile	.18	.16
Energy Costs per Mile	.39	.23
Total Operating Cost per Mile	.55	.41



# CNG – Electric Bus Comparison

- **Range Between Fueling/Charging**
- **CNG -400 miles**
  - **Electric –Up to 350 Miles in Ideal Conditions. Varies by passenger load, use of A/C, terrain, battery temp. and driving habits**
  - **Requires Charging Stations for Longer Routes**







# CNG – Electric Bus Comparison

- **Electric Bus Initial Capital Investment**
- **Bus -\$904,490**
- **Overnight Charger -\$50,000 (plus supply charges)**
- **Fast Charge Station -\$750,000 to \$1.0 Million per Station**





# Conclusions

- **Electric Bus Technology is Improving**
- **Initial Capital and Operating Costs is Higher than CNG**
- **Electric Bus Costs could decrease as technology improves**
- **Long term maintenance costs for electric buses are unknown, especially battery life and battery replacement costs**
- **CNG – longer history and experience. Fixed costs for infrastructure and fuel.**