Going Electric!
Electric Bus Technology and Vermont Pilots

Bi-State Electric Vehicle Connector

Benjamin Lake
To act with urgency to enhance the economic, environmental and societal benefits of clean and efficient energy for all people.
• Why Go Electric?
• Electric Bus Fundamentals
• Vermont Pilots
Why do we care?
Transportation, Climate Change, and Health Impacts
Electric Bus Benefits

• Better for the environment and public health
• Quieter
• Cheaper to run
  • Electric buses are less expensive to fuel, more efficient, and have lower maintenance costs compared to diesel
• Energy independence
• Fuel price stability
• Potential value from using battery as an energy storage

US Average Retail Fuel Prices

$0.00 $0.50 $1.00 $1.50 $2.00 $2.50 $3.00 $3.50 $4.00 $4.50 $5.00

CNG Propane Diesel B99/B100 Electricity*

Jan Jul Jan Jul Jan Jul Jan Jul Jan Jul Jan Jul Jan Jul Jan

*Electricity prices are reduced by a factor of 3.4 because electric motors are approximately 3.4 times as efficient as internal combustion engines
Electric Bus Fundamentals
Overview: Electric Transit Buses in the US

Size of Opportunity
- 71,000 transit buses nationally
- 51% diesel, 23% CNG, 17% hybrid & electric, 8% biodiesel

• Electric transit buses are a relatively mature technology
  - Deployment across the United States
  - Multiple models and manufacturers
  - Vehicles range up to 300 miles on one charge
  - Cost has come down over the last 10 years but still considerably more expensive than a diesel vehicle
Major Manufacturers

- BYD
- Proterra
- New Flyer
- Gillig
Electric School Bus Fundamentals

Size of Opportunity
- 400,000 school buses nationally
  - 90% – 95% of the fleet is diesel
  - Most popular alternative fuel is propane
- Electric School buses deployed so far in CA, NY, MA, MN, ND, NJ

Barriers
- Upfront Costs - 2 – 3 times the cost of a diesel
- Requires new fueling practices and infrastructure
- Requires training for mechanics and drivers
Major Manufacturers

- Thomas Buses
- Proterra
- LION
- Blue Bird
- Starcraft Bus
- TransTech
Electric Bus Operational Considerations

- Range impacted by weather, terrain, HVAC use
- Increased fueling time
- Potential for increased electricity “demand costs” if charging isn’t actively managed
- Some routes may not be good candidates for electric bus service
- Takeaway: All of these issues can be managed, and become less significant as technology improves
Vermont's Electric School & Transit Bus Pilot Program
Project Overview

Goals
• Evaluate viability of electric buses in Vermont, across a range of route conditions, geographic areas, and types of weather
• Maximize air quality benefits – engine age and disproportionately impacted areas
• Expose Vermonters from different communities, regions and demographics to electric bus technology

Key Players
• VT Agency of Natural Resources – Dept of Environmental Conservation
• VEIC
• Vermont Energy Education Program (VEEP)
• Participating Schools and Transit Fleets
Pilot Details

Participating Schools and Transit Fleets
- 2 schools
- 1 transit agency

Timeframe
- 2 year project, including 1 year data collection and reporting
- Currently selecting Project Partners, invite-only (as determined through RFQ process) - RFP responses due October 2, 2019

Funding
- VT allocated ~$2M of total $18.7M in VW funds to support these pilots
- Generally, incremental cost of BEBs and charging funded by VW Settlement
Major Tasks

Year 1: Program Development
• Select Partners
• Select & Purchase Vehicles
• Select, Purchase & Install EVSE
• Managed Charging Plans
• Data Collection Plan

Year 2: Program Implementation
• Deploy Vehicles, Train Staff
• Technical Assistance and Data Collection
• Reporting
Other Vermont Electric Bus Projects
Prior VT Experience

Electric bus testing Feb - Apr 2017
  • Advance Transit
  • Green Mountain Transit
  • University of Vermont

Results –
  • the all-electric bus was more efficient, less expensive to operate, and produced significantly lower emissions than a new diesel bus
  • Performance and savings varied by operating environment.
  • Drivers generally liked the electric bus experience
Upcoming Electric Transit Bus Projects

Green Mountain Transit
• Deploying 2 full-sized electric transit buses in Burlington this Fall
• Deploying 2 smaller “cutaway” electric buses in Montpelier in near future

Advance Transit
• Deploying 4 full-sized electric transit buses in Upper Valley region in 2021

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Summary

• Programs are underway to advance electric buses
• Funding can help bring down the upfront costs
• Seek utility input in procurement decisions & charging plans to maximize cost savings
• Technical assistance is available from several sources
• More options coming!
Questions?

Contact:
Benjamin Lake
blake@veic.org
802-490-5113