



Working with BEB Charging Infrastructure: New Considerations On-route and at the Depot July 15, 2020

Welcome



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Panelists





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Battery Electric Bus Deployments Webinar Series

Transit Agency and Utility Partnerships: Best Practices and Strategies for Successful Electric Bus Deployments

- Friday, May 8, 2020
- Speakers from Austin Energy, Southern California Edison, and Evergy

Transit Agency & Utility Partnerships: Case Studies from Denver, Minneapolis & Portland

- Tuesday, June 16, 2020
- Speakers from RTD, Metro Transit, Excel Energy, TriMet, and Portland General Electric





Audience Questions

To submit a question or comment to the moderator during the webinar, please type it into the **Questions** box in the menu panel.

Please identify your company/agency before you type your question:

Ex. "APTA – what day is this?"





Panelists' Presentations





Martha's Vineyard Transit Authority

MARTHA'S VINEYARD TRANSIT AUTHORITY ENSURING A RELIABLE AND SUSTAINABLE SYSTEM FOR ALL

2016

Question: Is there a fuel that can better serve the VTA's operational needs? Answer: Yes, it's electric! But.... The Solution: An electrified transit fleet, with in route charging fueled by a renewable energy micro-grid

REDUNDANT ELECTRIC CHARGING SYSTEM

- Allows charging when the grid is down
- Reduces electrical demand charges
- SUPPORTS FAST CHARGING SYSTEMS TO AVOID EXTREME DRAWS OF ENERGY OFF THE GRID

Better for the Community and the Environment

- Based on tools available from the Argonne National Lab, GHG reduction is \$3,014 per year per bus.
- The solar installation adds in another \$6,863 per year in GHG reduction.
- The American Lung Association guidance shows \$5,288 per bus in health cost reduction from decreased diesel exhaust inhalation.

\$1,200,000 \$1,000,000 \$600,000 \$400,000 \$200,000 \$200,000 \$0 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029

Projected Health and Environmental Impact

- GHG Reduction DOE Dollar Equivilant
- Health Benefits American Lung Assoc. Dollar Equivilant
- Cumulative Value

VTA Cost Savings

- Electrical System Capital Costs and Operating Costs total ~\$1.5 Million over 10 years
- System benefits total \$4.1 Million Cost Savings over the same time frame
 - Solar Generation Savings
 - Battery Reduces Demand Charges
 - Battery allows for electric market participation
 - Fuel Cost Savings of switching from Diesel to Electric
- Cost savings allows VTA to provide more service to the Island (shorter headways, more routes, etc.)

Cumulative Annual Cost and Benefit Outlay



Project Phases







Fleet electrification

Charging and microgrid at facility



On-route charging and microgrids

Planning and engagement Funding Campaign



VTA Experience to Date

- Strong reliability; low downtime
 - 371,000 electric miles driven to date
- About \$40,000 in fuel cost saving to date
 - Will only increase with time
- Range decreases 35-50% in coldest conditions

Lessons Learned (so far)

Build a Team You Trust

- Determine if you want to manage the project or hire general contractor
- Regular communication is key
- Role clarity is important



Software is Important

- Software is needed to ensure all components can speak to one another
- At this point there is no off-the-shelf software solution; customization will be needed and can be expensive
- Lay out the goals of your system and work with a software company to reach those goals

Engage Stakeholders Early and Regularly



Public

着 Utility

Local Leaders

Plan Your Charging

- Charging controls will allow you to charge at the lowest cost times.
- Key things to consider when you are planning charging
 - Utility rates
 - Location of chargers (depot and on route)
 - Where are there weakness in the plan? Where is more redundancy needed?
- Monitor
 - Once you are up and running regular review of mileage and utility bills will help you identify issues early.

Energy Storage Allows for Flexible Charging

Energy storage helps in two ways to allow the VTA to charge whenever necessary without facing demand charges:

- The micro-grid at the main hub allows for cost savings when the buses are charging at the depot
- On route charging with storage will enable to VTA to charge whenever needed for smooth operations without demand charges



Thank you

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King County Metro Battery Electric Bus Program

APTA New Battery Electric Bus Electrical Infrastructure Considerations



Our fleet today

- **1600 Buses Total** (95% of the fleet is Diesel-Electric Hybrid, ETB or BEB) in addition to Ferry, Light Rail. Streetcar, Access, Van Pool...
 - **195 Zero-Emissions Buses** (12% of our fleet, 20% of trips are zero-emissions)
 - 174 Electric Trolley Buses (ETBs or Trolleys)
 - 11 Fast Charge 40' Battery Electric Buses
 - 10 Extended-Range 40' & 60' Battery Electric Buses (Test-2019) – Leased
 - 40 Extended-Range Battery Electric on order





Battery Electric Bus: Programmatic Considerations

Construction	 Design/Bid/Build vs. Progressive Design Build – alternative delivery methods Schedule challenges/Equipment/Purchasing 	
Commissioning	 Charger and Bus work with each other? Interoperability J3105-1, 1772, OCPP, Open ADR compliant? 	
	Charging	 On Base and layover (aka on route) charging Smart Charging
	Electricity - Utility	 Clean Energy/Green Power Rate structure – Seattle City Light pilot tariff
King County METRO Moving forward together	Operations	• Employee Training

South Base Test Facility

- Support 40 New Flyer BEB order arriving in 2020
- Designed to demonstrate interoperability between charger and bus OEMs
- Overhead Charging (pantograph down)
 - Mast (1)
 - 🕨 Gantry (2)
 - Platform (3)
- Plug In Charging (4)







South Base Test Facility Challenges

- Cost varying estimates
 - Permitting timing
 - Commissioning Anticipated
 - Manufacturer readiness
- Space constraints
- Operational Reliability and Support





Lessons Learned

- Agency Culture groups to involve, when and how
- Utility Partnership
- Training
- Manufacturer readiness





Questions?







Q & A



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Radhika Moolgavkar King County Metro



JOIN US FOR THESE UPCOMING APTA VIRTUAL EVENTS Sustainability & Multimodal Planning Workshop JULY 30-31

Mobility & Rail 7////// AUGUST 12-13

APTAtech SEPTEMBER 9-10



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Thank you.

