Best Practices for Implementing Battery Electric Buses into Your Fleet

APTA Emerging Leaders, 2019

Ian Adams, RFTA
Mike Nabhan, RTD
Andy Wakefield, Intueor
Lisa Womack, KCATA

AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

Our Team

Ian Adams
Operations Manager
RFTA, Aspen CO

Mike Nabhan
Asset Performance Manager
RTD, Denver CO

Andy Wakefield
Principal Consultant
Intueor Consulting, Irvine CA

Lisa Womack
Regional Mobility & Contracts Manager
KCATA, Kansas City MO

Pros vs. Cons of BEBs

Pros

- Low/No emissions
- Quiet
- Lower total ownership costs
- Cheaper to operate and maintain
- Government subsidies

Cons

- Higher initial costs
- Less predictability (range/performance)
- Technology may limit route/run application
- More planning and monitoring required

Current Landscape

- Demand is on the rise
- Cost per unit to decrease as manufacturing becomes more efficient
- Diminishing concerns over range anxiety
- Technology advances – faster charging, wireless charging, battery capacity, solid state batteries, fuel cell range extenders
- Drivetrain and power draw improvements

Insights from the Field

- You can't do too much research
- Why are you going electric, what is the value to your agency – have clear KPI's
- Know your funding streams and requirements – FTA Low-No, local funding partners
- Understand your infrastructure and limitations
- Start small and be scalable
- Remember to include disaster planning

Insights from the Field

Partnerships

- Engage your board, key stakeholders/public officials and the public
- Partner with your utility company early - before, during and after implementation
- Communicate with other transit agencies
- Build relationships with manufacturers

Charging Plan

- Use demand management to keep electricity expenditures reasonable
- Make sure service demands will work with technical constraints

BP's for Charging & Infrastructure Planning

- Work with utility provider ahead of time
- A single bus charger is ~80kW
  - Running for 1 hour, this could power 2.5 average US households for a day
- New service must be run
  - Track costs separate from facility
  - Negotiate special rates
- Facility planning is a must
- Usable capacity is about 70% of "salesman capacity"

Improving Your BEB Range

- Pre-condition vehicles on chargers
- Use opportunistic charging if it suits your service
- Consider climate controlled battery storage
- Audit manufacturer claims against operational history

Denver RTD

- Operates 36 BYD Buses
  - Custom Designed (3 Doors, Right Hand Drive)
  - Received two vehicles early for testing

- Extreme Operating Environment
  - Snow, Salt, Freezing Temperature
  - Operating range varies based on environmental conditions

You Should Consider BEBs When…

- Research and analysis of your routes have been performed for compatibility with optimal range and performance criteria
- You have a service area that consists of shorter, high-ridership runs, that will justify the price of BEBs with ridership demand and vehicle performance capabilities
- You have a procurement strategy in place that considers matching BEB type and charging infrastructure with your service demands and schedules
- You provide service in a temperate climate

You May Want to Wait if…

- You are uncertain as to how you will implement BEBs into your schedule and on which routes
- You do not have a plan for charging that corresponds with optimal utility pricing
- You operate in a location with long service routes and highly-dynamic utility pricing
- You operate in an environment that has extreme temperature and elevation changes

Considerations for Fleet Integration

- Consider a pilot program to evaluate operational demands and procedures
- Evaluate staging procedures and the challenge alternative fuels present
- Determine branding for your fleets BEBs and communicate to public how and what services they will be used for
- How BEBs will integrate with your current Fleet Management Plan

Further Considerations

- BEBs require a higher storage capacity at maintenance facilities due to current range and charging restrictions
- Design and implement training programs for operators, maintenance personal, and local emergency responders for BEBs
- Implement and enforce programs that track efficient driving by operators to maximize BEB utility

Recap – Key Considerations

- Demand is on the rise & technology improving
- Planning and Research vital to successful implementation
- Procurement strategy that matches BEB type and charging infrastructure with service demands and performance metrics
- Opportunistic charging expands range of vehicle
- Work with energy provider for optimal pricing and strategy
- Thoughtful and meaningful partnerships with stakeholders
- Consider differing logistical demands

Thank You