

Electric Transit User Group Forum Meeting Summary

Topic: Fleet Transition Planning

Dates: April 9 and 15, 2024

The Electric Transit User Group (ETUG) regularly gathers to inform the National Renewable Energy Laboratory's (NREL) strategic direction to help address pressing needs associated with electrifying transit fleets, including technical challenges, workforce development, operations and maintenance, procurement, and other hurdles. Information collected through ETUG listening sessions generates key insights that could inform future research, technical assistance needs, and funding opportunities.

The following is a summary of the discussion and key takeaways from the April 2024 sessions on fleet transition planning. NREL will use participant input and insights into fleet concerns to tailor its resources. NREL also plans to continue hosting listening sessions throughout FY24 on various topics to help address ongoing challenges and identify further resource gaps.

Participant Discussion Summary

Initial Steps and Considerations for Planning

- Some participants created a detailed fleet transition plan after securing funding to electrify their bus fleet (i.e., federal grant) or a state mandate triggered zero-emission bus (ZEB) purchases. Others used a small ZEB pilot as a starting point for a future plan.
- Smaller transit agencies and those aiming for 100% of their fleet to be made up of ZEBs were more likely to rely on consultants for their transition planning, while larger agencies and agencies with lower ZEB targets conducted more planning work internally.

Planning Approaches

- **Data:** Participants used telematics data as their preferred means to assess suitability for ZEBs. Analysis of the data can be a key benefit of working with consultants.
- **Strategy:** Two main strategies used by fleets emerged: “Facilities-first” planning prioritizes long-term ZEB integration by first addressing facility-related challenges, while “vehicles-first” planning involves immediately and continually integrating ZEBs into annual procurement cycles.
- **Workforce Development:** All participants stressed the importance of ensuring their maintenance staff are trained to service zero-emission buses.

Transition Adaptability and Flexibility

- **Adapting to Change:** Participants emphasized the need to treat ZEB transition plans as living documents to keep them up to date. This could involve in-house adjustments based on new information, annual reviews with consultants, or periodic assessments with a longer-term view (e.g., 5 years).

- **Uncertainties Create Barriers:** Participants shared concerns about limited visibility into future technology advancements and lack of standardization in charging and vehicle systems.

Technology Selection

- **Vehicle Selection**
 - Participants prioritized maximum range for battery electric buses (BEBs), citing cold weather, battery degradation, and block flexibility as limitations on shorter-range models. Participants weren't considering on-route charging due to technical and administrative challenges.
 - Participants viewed hydrogen fuel cell electric buses as a viable option in areas with existing infrastructure, with some agencies prioritizing hydrogen and waiting for BEB technology to improve.
- **Durability Concerns:** Participants expressed concerns about the impact of heavier BEBs on suspension components and the need to factor battery degradation into block assignments even for newer vehicles. They are replacing individual battery modules on an ongoing basis as they go out of spec, and thus mid-life replacement of the entire battery may be rare.

Facility Considerations

- **Challenges with Existing Facilities:** Upgrading older facilities for ZEB support can be difficult due to factors like contracts with depot operators, limited space for charging infrastructure, potential safety hazards, and accommodating disruptions to operations caused by construction.
- **New Facilities vs. Retrofits:** Building a new facility is seen as less disruptive, but the decision hinges on various factors, including the condition of the existing facility and the feasibility of overcoming upgrade challenges.

Operations

- **Adaptation Levels for Existing Operations:** Some agencies prioritized minimal adaptation, insisting ZEBs should seamlessly integrate into current practices. Others were willing to adjust operations (i.e., scheduling, blocks) to accommodate ZEBs without increasing fleet size. A third group, particularly agencies operating in colder climates, viewed adaptation as essential and wished to consider increasing fleet size as well.
- **Blocking Strategies:** Blocking (dividing service routes and schedules into smaller, manageable units) for ZEBs needs to account for worst-case range scenarios, potentially requiring adjustments compared to traditional buses. Some agencies, especially in colder climates, reported re-blocking routes for BEBs. Others found their existing block structures sufficient. Re-blocking can have hidden costs, like increased labor hours due to shorter blocks, but these costs could be offset by the efficiency of longer-range buses. Optimizations may also be possible to minimize extra costs.

Key Takeaways

NREL identified the following key takeaways from the ETUG listening sessions on transition planning. NREL will seek opportunities to help address these takeaways through the lab's technical assistance offerings.

- Battery degradation is already affecting BEB operations, and more study of real-world BEB battery degradation is needed.
- Transit bus operators face uncertainty about whether to retrofit an existing facility or build a new one.
- Blocking strategies are complex but may be useful for BEB integration.
- Regular industry updates on transit-specific ZEB technology developments could help keep transition plans current.