NATIONAL CENTER FOR APPLIED TRANSIT TECHNOLOGY

Planning for Fleet Transitions to Zero Emission Vehicles

NATIONAL CENTER FOR APPLIED TRANSIT TECHNOLOGY

- Walking small agencies through the technology landscape
- Producing resources on adopting emerging technologies
  - Zero-emission vehicles, green infrastructure, data management, new software decisionmaking
  - Lessons learned, trends, strategies
- Providing in-depth technical assistance to adopting new technologies
  - Strike Teams and State Summits
  - Enabling technology transfer
- Developing hands-on workshops to understand how different technologies can be applied
  - Data Management, Digital Tools for Redesigns, Free GIS Tools

n-catt
National Center for Applied Transit Technology

Find us at: n-catt.org

TACL: THE TRANSPORTATION TECHNICAL ASSISTANCE COORDINATION LIBRARY

http://transportation-tacl.org

The Transportation Technical Assistance Coordination Library (TACL) provides a sustainable methodology and platform for access and findability of coordination resources across a diverse range of transportation technical assistance centers and the Federal Transit Administration (FTA).

The FTA-funded technical assistance centers participating in this ongoing work with links to their coordination resources are:

- National Aging and Disability Transportation Center (NADTC)
- National Center for Applied Transit Technology (N-CATT)
- National Center for Mobility Management (NCMM)
- National Rural Transit Assistance Program (National RTAP)
- Shared-Use Mobility Center (SUMC)

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DISCLAIMER

This webinar is designed for transit agencies who are in the beginning stages of planning their transition to low or no-emission vehicles. This content will not provide guidance on how to apply for the current Low or No Emission Vehicle Program – 5339(c) funding opportunity that is available.

For more information about FTA's Low or No Emission funding opportunity, please visit the FTA website here: https://www.transit.dot.gov/lowno

N-CATT Webinar

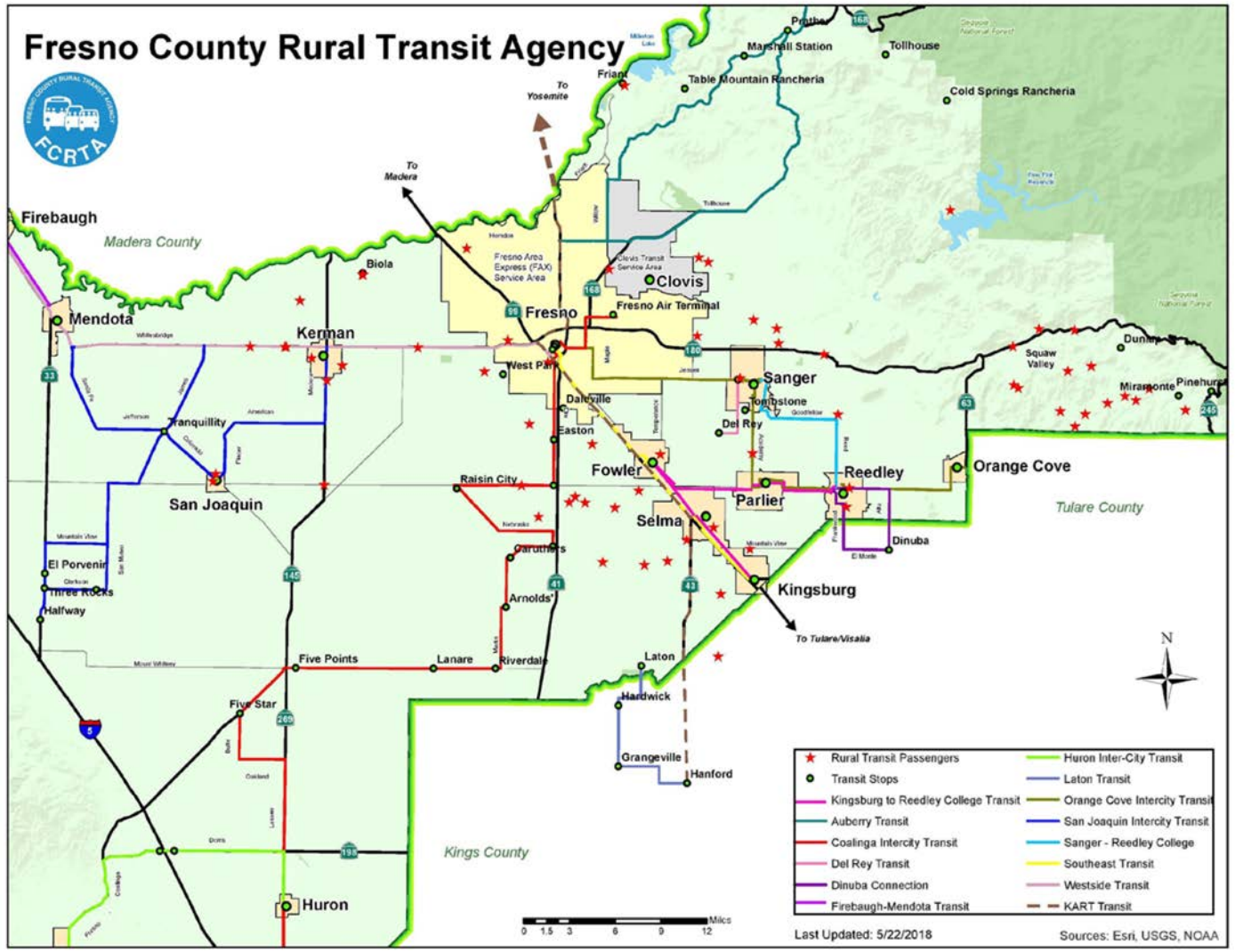
April 26, 2022

EV Fleet Transition Planning

Fresno County Rural Transit Agency

FCRTA Fresno County Rural Transit Agency

FCRTA Service Area & Rural Transit Passengers



FCRTA's Current Fleet

- Vehicle fleet of one hundred and twenty-two (122) vehicles
- Forty-four (44) are powered by CNG
- Twenty-three (33) are powered by electric batteries
- FCRTA does not operate any diesel powered vehicles
- Goal of 2030 to have 100% EV fleet

BYD

Chevy Bolt

Zenith

Proterra

FCRTA's Current Charging Infrastructure

- 24 Envision Solar Arc's (Level 2)
- 4 BYD Chargers (Level 2)
- 8 Proterra Chargers (Level 3)
- 25 JuiceBox Chargers (Level 2)
- 2 Envision Solar Trees (Level 3)

JuiceBox Charger for Bolt/Zenith

Proterra Charger

BYD Charger

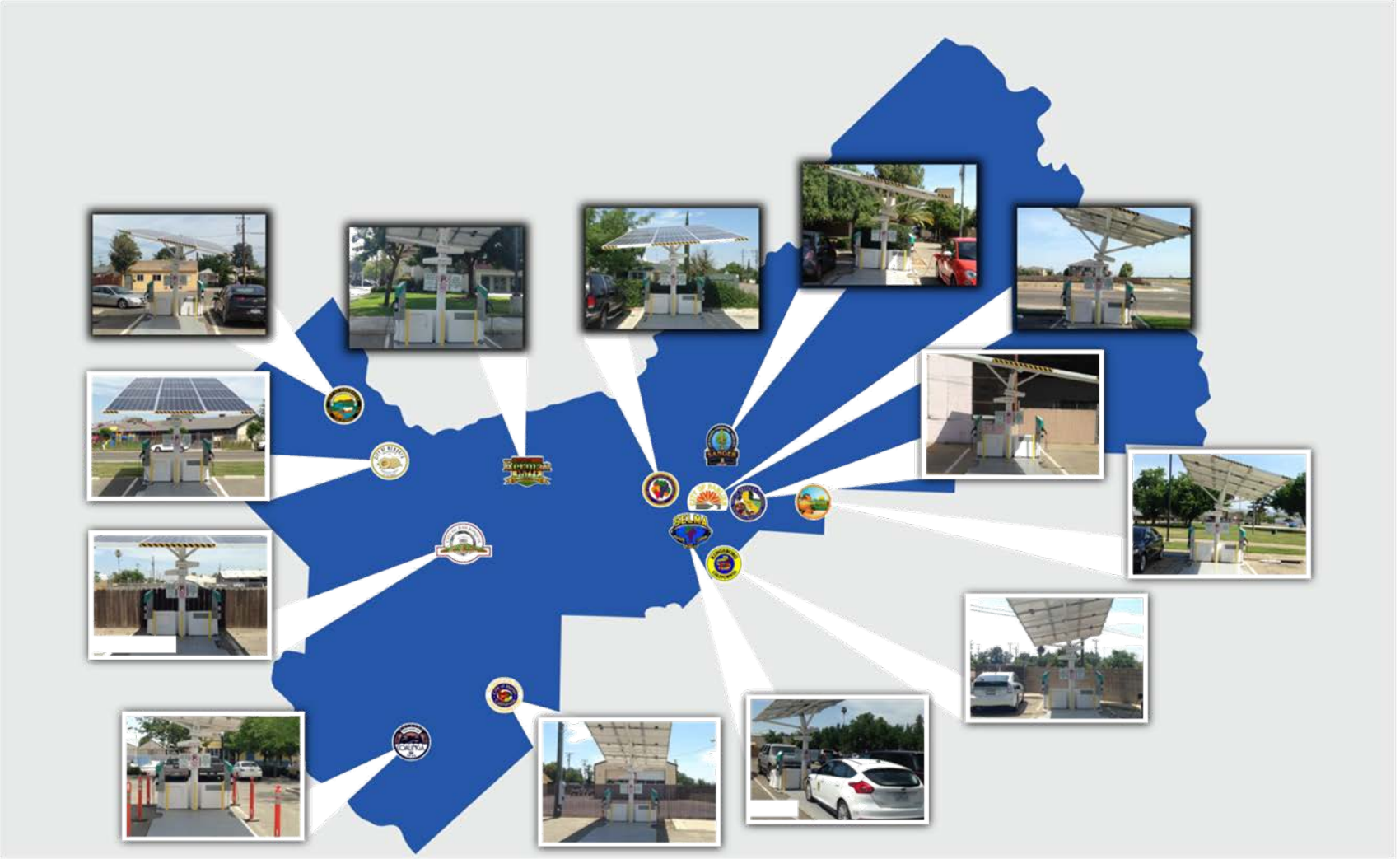
Solar Tree

Solar Arc

FCRTA Solar EV Charging Stations

- FCRTA placed 24 EV ARCs at all 13 rural incorporated cities throughout Fresno County
- EV ARC fits inside a parking space, requires no trenching or permits, CEQA exempt, and can be deployed in hours as well as moved to another location if needed
- Equipped with battery storage to provide Level 2 EV charging day or night – up to 225 miles of EV driving generated per day
- Can be used for emergency power during a grid failure.

FCRTA Solar EV Arc Charging Stations



Solar Tree Charging Units (2)

- Solar trees will charge (2) BYD 35 ft electric buses
- 35 foot by 35 foot solar array
- Shades 6-8 standard car parking spaces
- Specific rural site locations:
  - 1705 S Anchor Ave,

  Orange Cove CA 93646
  - 779 East Polk Ave,

  Coalinga CA 93210

(Depending on power source availability)

Implementation of Electric Vehicles & Chargers

- Traditional transit is being affected by a decline in ridership and as a rural public transit agency we need to explore alternative modes of transportation with electric vehicles
- Drivers must receive special training on how to operate ZEV's in order to optimize range
- An FCRTA transit route is specifically selected to be used with a ZEV (due to the high mileage of rural transit routes)
- Infrastructure must be in place to allow charging in other cities where the vehicles are stored
- Grid capacity for charging infrastructure creates challenges for installation and charging

Planning for Electric Vehicles & Chargers

- Consider the total cost of ownership and evaluate the costs and benefits of various vendors including vehicles, charging, maintenance, electricity/fuel, warranty.
- Assess what type of vehicle will work for routes based on range, weight, length.
- Evaluate your infrastructure needs to support a transition to electric.
- Pursue various funding to support projects to transition to electric.
- FCRTA applied for an Electrical Grid Study to prepare for transition to an electric fleet.

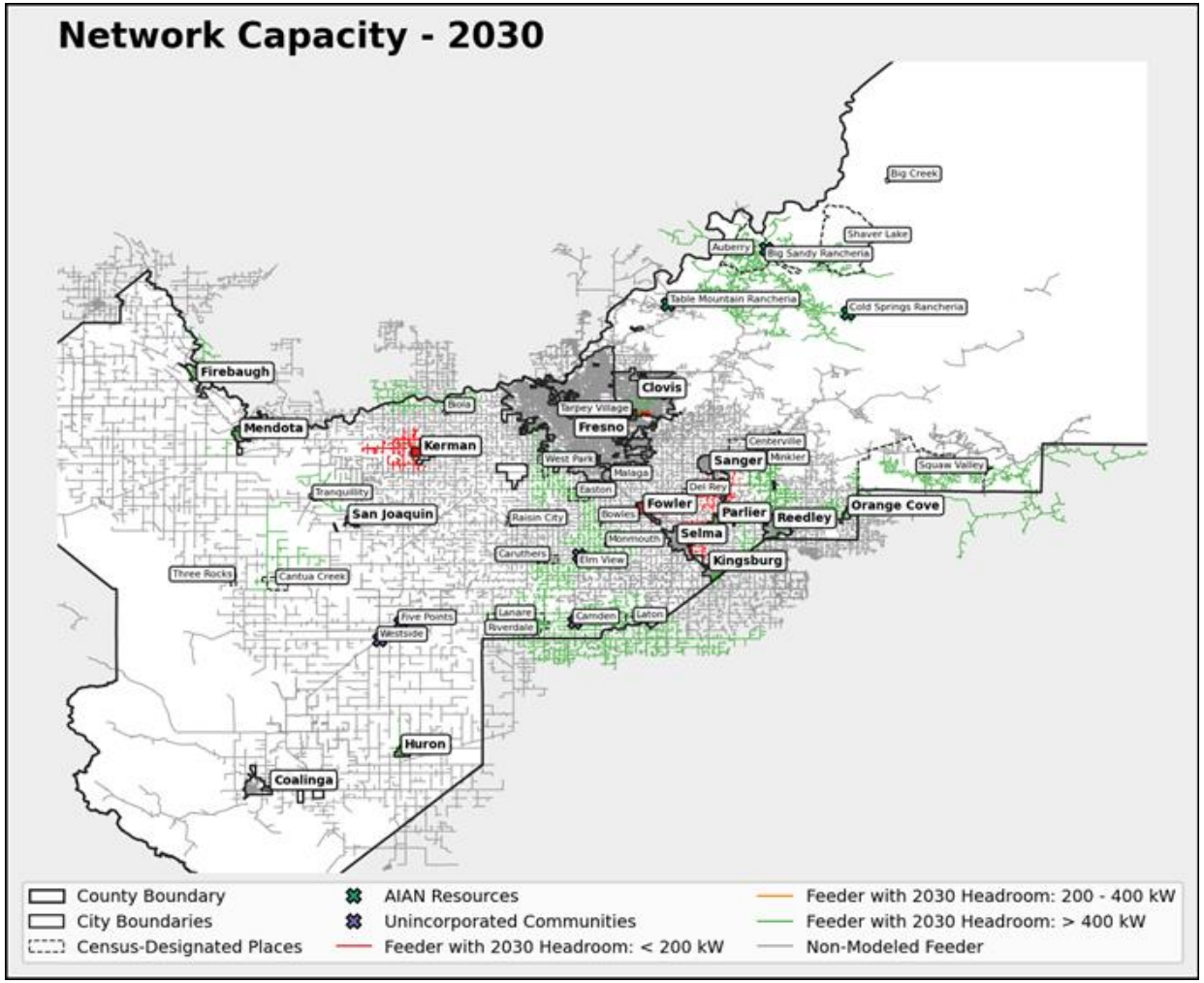
Grid Analysis Planning Project:

FCRTA was awarded $515,800 from the Caltrans Sustainable Communities Planning Grant for a project to analyze the current grid system in rural Fresno County

Grid Study Objectives:

- ✓ Assess the electrical grid system
- ✓ Identify grid infrastructure upgrade opportunities
- ✓ Prioritize EV infrastructure
- ✓ Address needs of rural Cities and unincorporated rural communities
- ✓ Identify innovative strategies and approaches
- ✓ Develop cost estimations and identify funding and financing resources

Fresno County- 2030 Network Capacity

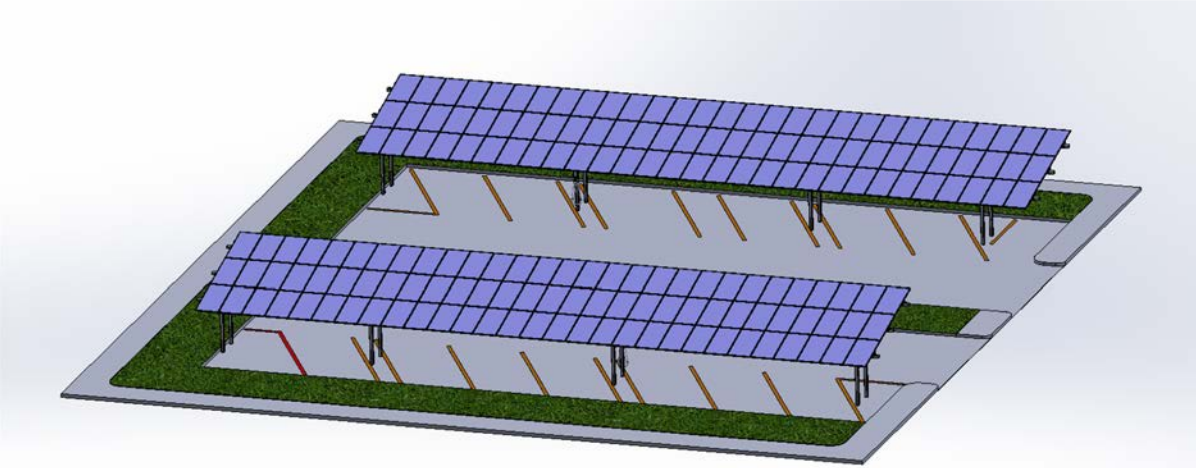


Resilience Hubs:

Resilience Hubs and Microgrids are one of the recommendations resulting from the Grid Analysis Study Report to support FCRTA's transition to EV.

- Resilience Hubs
  - During normal conditions, a resilience hub is intended to strengthen community ties and prepare community members for natural disasters and emergency scenarios.
  - During a disruption (like a fire or flood), a resiliency hub is intended to empower communities to get the support and resources they need when government aid may be slow/nonexistent.
  - At a minimum, a resilience hub needs to be supported by a microgrid (solar and storage) that can operate in island mode in the event of a power outage to provide a continued electricity, AC, air filtration, Wi-Fi, and ability to charge EVs for access to hospitals, grocery stores, and to support rescue missions when public transit may not be in operation.

Modernized Electric Grid Structure with Microgrid



Current Studies:

- **Studies:**

- Fresno EV Microtransit Plan was completed in January 2021 and funded by the FCOG Sustainable Infrastructure Planning Grant ($160,556).
- Electrical Grid Analysis Study for the incorporated and unincorporated communities was completed January 2022 and funded by the Caltrans Sustainable Communities Planning Grant ($515,800).
- Transportation Needs Analysis Survey to analyze transportation needs in the unincorporated community of Biola ($36,885).
- Transit Bus Air Flow Study in partnership with the Fresno State Transportation Institute to study the COVID virus and air flow through a transit bus (study concluded 2020).
- Microtransit study to examine the expansion of existing FCRTA microtransit service in unincorporated communities of Lanare, Cantua Creek, Laton, Riverdale and El Porvenir, this project is in partnership with Leadership Counsel for outreach efforts ($59,000).

Future Projects:

- **Future Projects:**

- Microgrid/Resilience hub feasibility analysis to analyze costs and locations for solar microgrids in rural Fresno County ($455,500).
- Affordable housing project through the Affordable Housing and Sustainable Communities (AHSC) program in partnership with City of Coalinga, project includes housing, 2 electric buses, transit amenities and passes.
- Affordable housing project through the Affordable Housing and Sustainable Communities (AHSC) program in partnership with City of Sanger, project includes housing, solar parking, electric bus and charging station.
- Light-rail feasibility study along SR99 corridor with funding from the Caltrans Sustainable Communities Planning Grant.
- These projects are consistent with the 2018 Fresno COG RTP, CTP 2040 and GHG reduction targets.

Thank you

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FCRTA Fresno County Rural Transit Agency

BEBs at Blacksburg Transit

Lessons Learned

Tim Witten – ITS/Special Projects Manager

Agenda

- Blacksburg Transit
- Pathway to BEBs
- Lessons Learned
  - Vocabulary
  - Operations

Blacksburg Transit

Blacksburg Transit - 1983

- 8 buses
- 3 routes
- 95,000 passenger trips
- Operated out of a trailer
- 32 staff

Blacksburg Transit - 2022

- 53 buses
- 16 routes in Blacksburg, 2 in Christiansburg
- 4,659,053 passenger trips (FY2019)
- Operates out of a 95,000 SF facility.
- 165 staff

Pathway to BEBs

- 2009 Alternative Fuels Study
  - Bio-Diesel
  - CNG
  - LPG
  - Hybrid Buses
- ARRA funding
  - 14 – 2010 New Flyer Hybrid Electric Diesel Buses
    - 2 – 60ft buses
    - 12 – 40ft buses

Pathway to BEBs

- VW Environmental Mitigation Trust (FY2019 grant)
  - 5 - 2020 New Flyer Battery Electric Buses (BEBs)
    - 3 - 35ft buses
    - 2 - 60ft buses
  - Charging Infrastructure
    - 2 - Depot Chargers
    - 5 - Depot Dispensers
    - Switchgear and Electrical Upgrades

Pathway to BEBs

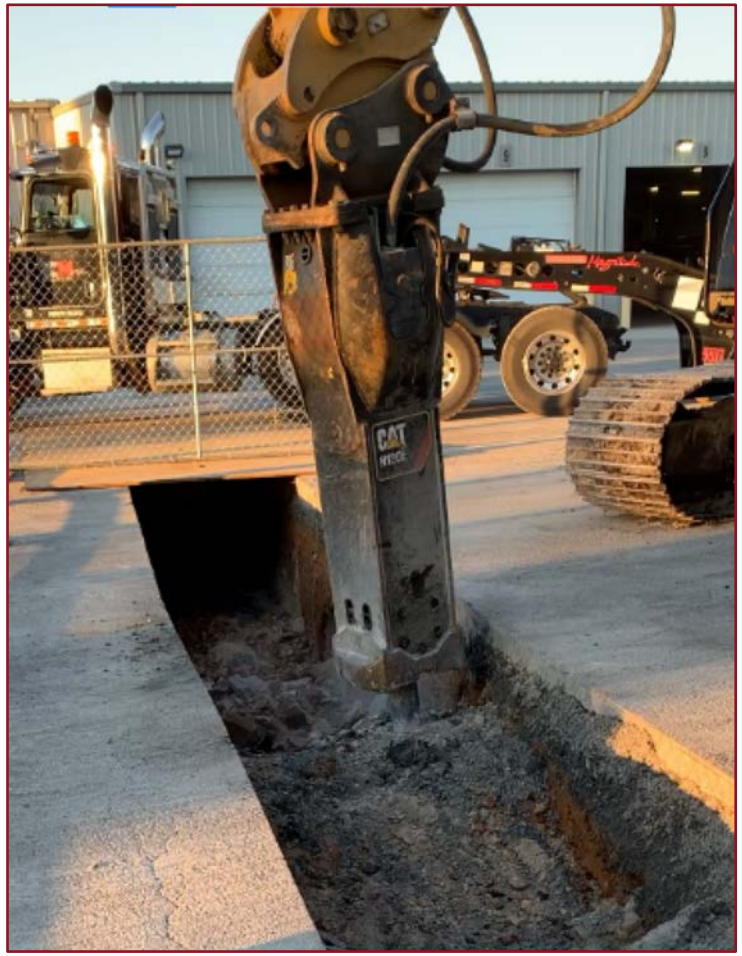
- FY2021 Low No Grant
  - 5 - New Flyer BEBs
    - 3 – 40ft buses
    - 2 – 60ft buses
    - 1 – Opportunity Charger
    - 2 – Depot Chargers
    - 5 – Dispensers
- FY2021 DRPT/DEQ
  - 12 - BEBs
    - 12 – 40ft buses
    - 2 – Depot Chargers
    - 5 – Dispensers

41% Battery Electric by FY2025

BEB Vocabulary 101

Transformer

Duct Bank



Switchgear

Depot Charging

Charger

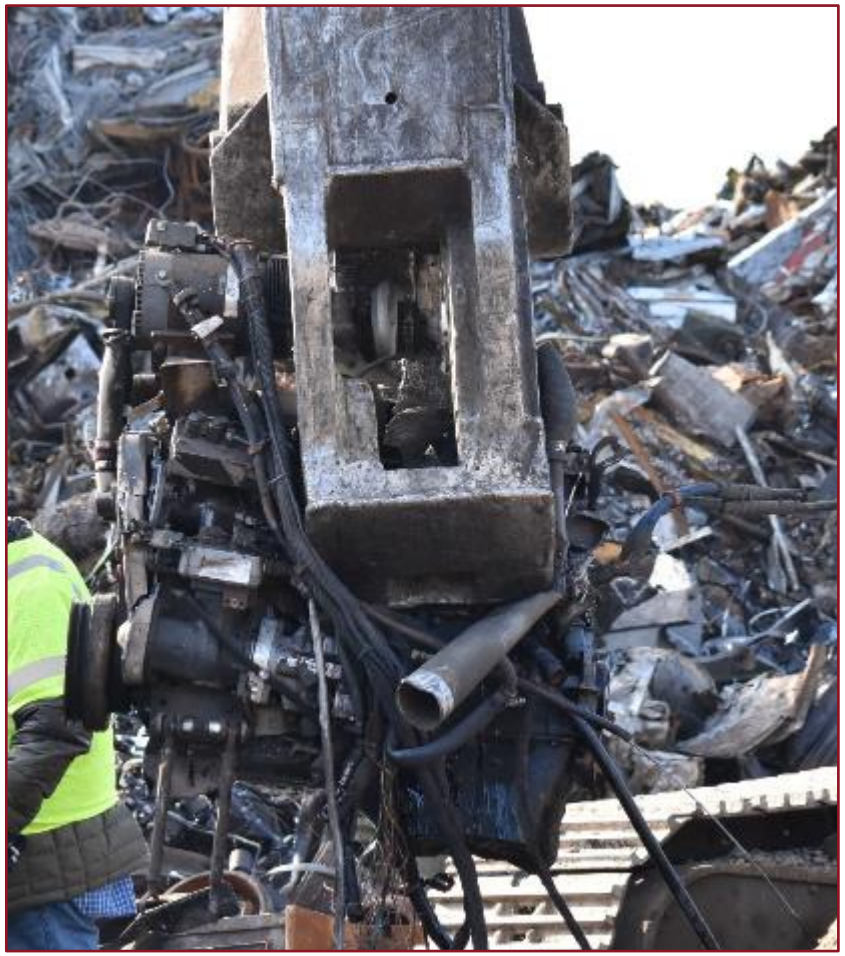
Dispenser

Opportunity Charging

Pantograph

Inductive

Scrappage



BEB Operations 101

Electricity Rates

- Tariff
- Off Peak vs On Peak
- Demand Charges
- NTD
- EIA (www.eia.gov)

Current APCO Charges		
Tariff 347 - Public Authority 12/21/21 Service Delivery Identifier: 00007330261512203		
On-Peak Generation (4080 kWh Used)	$	257.18
Off-Peak Generation (7680 kWh Used)		103.25
Transmission Services		242.23
Distribution Services		793.84
PIPP-Universal Service Fee		.48
Public Authority Surcredit		-49.98
Electricity Supply Service		
Fuel Factor @ 0.0230000 Per kWh		270.48
Current Balance Due	**$**	**1,617.48**
Total Balance Due Pay $1,641.74 after 01/11/2022	**$**	**1,617.48**

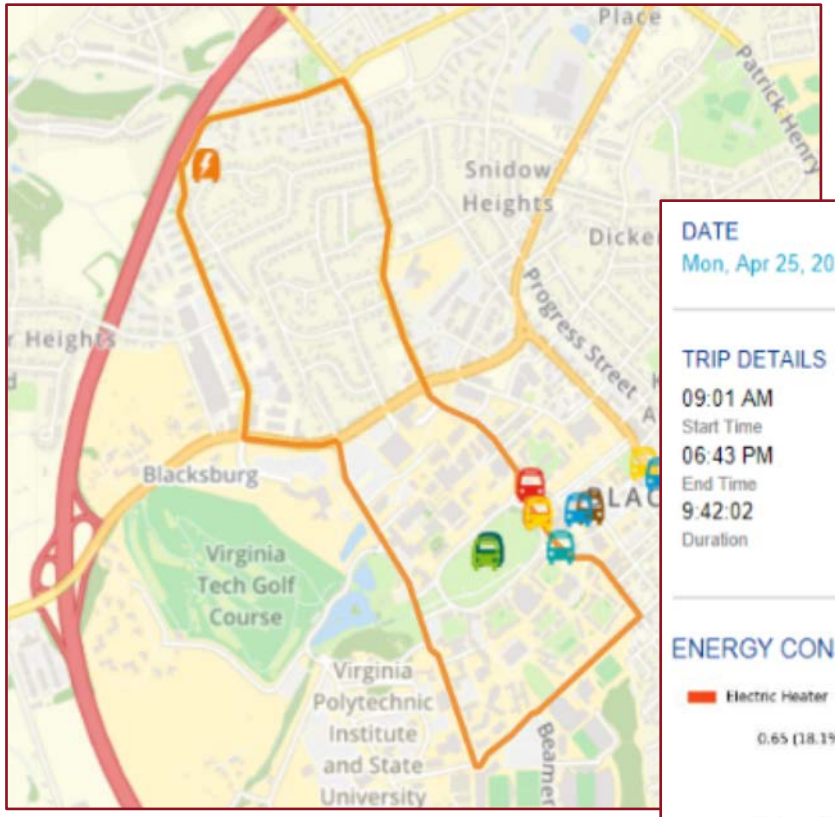
Factors Affecting BEB Range

- Ambient Temperature
- Route Design
- Load Profile
- Topography
- Route Timing
- Operator Training
- Battery Type/Age/Size
- Opportunity Charging

Ambient Temperature

Regenerative Braking

- Route Design
- Load Profile
- Topography
- Route Timing
- Operator Training

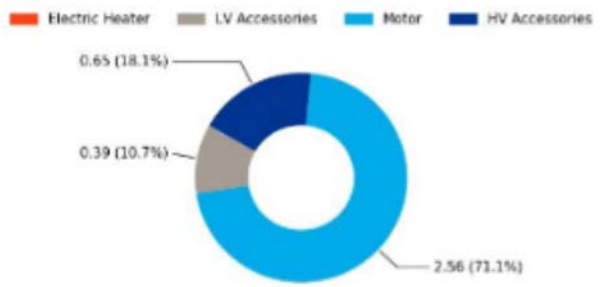


DATE	BUS	MODEL	ESS CAPACITY	TRIP	EV MAX SOC	EV MIN SOC
Mon, Apr 25, 2022	7021	XE60	466 kWh	1	94.4%	5.0%

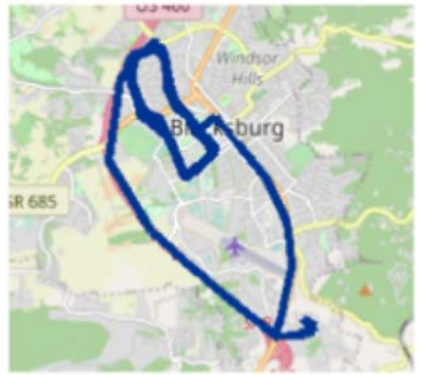
TRIP DETAILS

09:01 AM Start Time	87.54 Mileage (miles)	89.20 SOC Max (%)	3.60 Net Energy Consumption (kWh/mile)
06:43 PM End Time	78.45 Average Temperature (°F)	21.60 SOC Min (%)	32.47 Average Power Consumption (kW)
9:42:02 Duration	9.02 Average Speed (mph)	315.02 Net Energy Used (kWh)	

ENERGY CONSUMPTION BY SUB-SYSTEM (kWh/mile)



ROUTE



Battery Specifications

- Type
- Size
- Age

Contact Info

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Resources: https://drive.google.com/drive/folders/1glRDVoSHv5vKUijs2wWJa_010vjdNRwz?usp=sharing