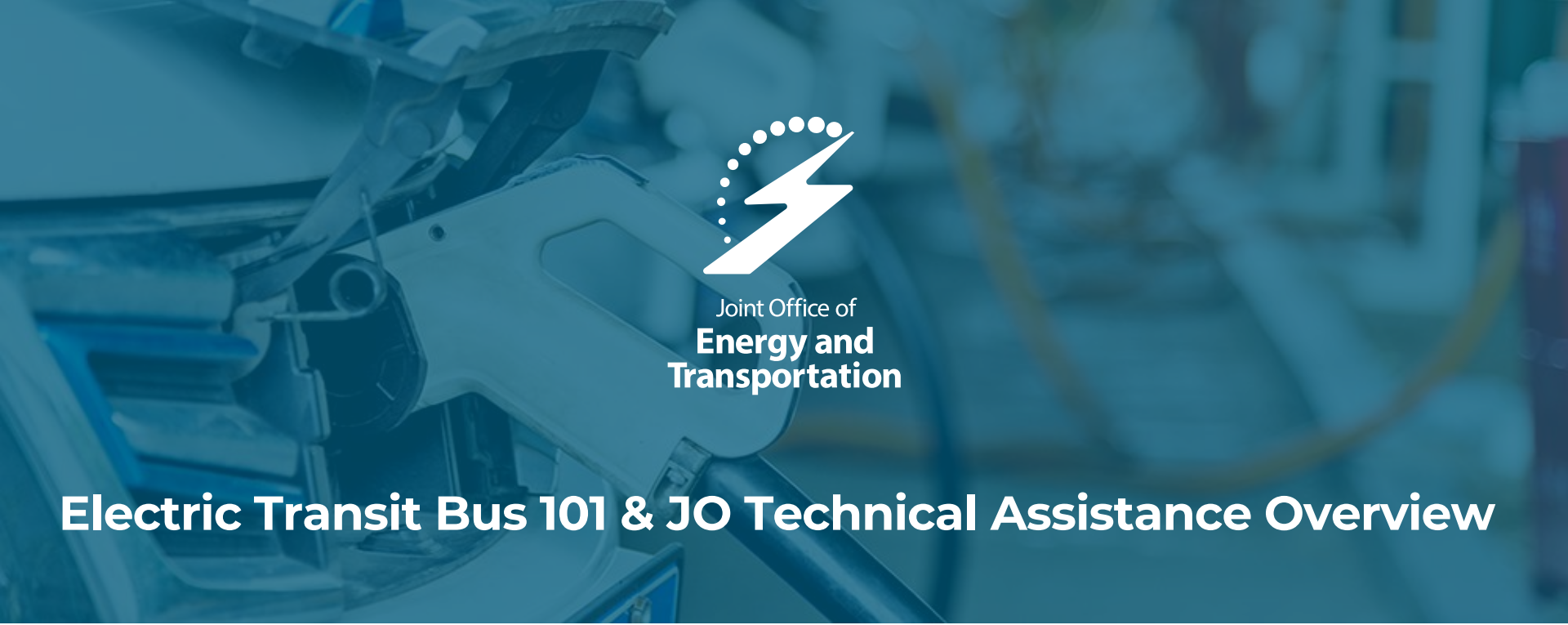


Joint Office of
Energy and
Transportation

Electric Transit Bus 101 & JO Technical Assistance Overview

Mike Jones
Project Leader, National Renewable Energy Lab (NREL)

Missouri Transit Conference
September 4th, 2024

driveelectric.gov

Joint Office Establishment

11/15/21 Bipartisan Infrastructure Law (BIL) signed into law

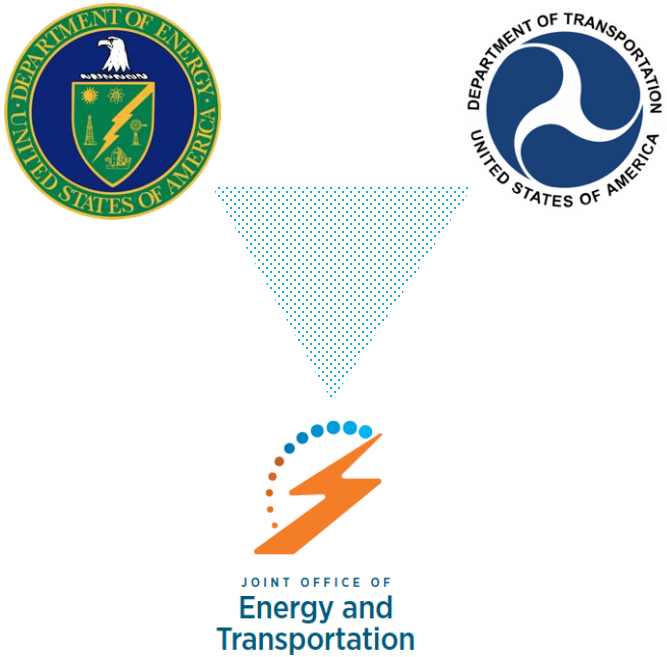
12/13/21 Biden-Harris Electric Vehicle Charging Action Plan released

12/14/21 Memorandum of Understanding (MOU) between the U.S. Departments of Energy and Transportation to establish a Joint Office of Energy and Transportation (Joint Office)

Secretary Jennifer Granholm
U.S. Department of Energy (DOE)

Secretary Pete Buttigieg
U.S. Department of Transportation (DOT)

Mission and Vision



Mission

To accelerate an electrified transportation system that is affordable, convenient, equitable, reliable, and safe.

Vision

A future where everyone can ride and drive electric.

Battery Electric Bus (BEB) vs Conventional Bus

- The main difference is the powertrain
  - Energy received through charge port
  - Battery stores energy to run motor
  - Electric motor converts electrical energy to mechanical energy

- Bodies, chassis, interiors, driving experience are all very similar

- Select a model that meets existing safety regulations, size, and other requirements


Photo: MBTA Silver Line Electric Bus

Charging

- Level 2
  - Lower power, longer dwell time
  - Moderate daily utilization
  - Less grid impact
  - Cheaper
- DC Fast Charging
  - Higher power, shorter dwell time
  - Quick top offs, mid-day charging
  - More grid impact
  - Expensive

J1772 AC Plug

J1772 AC Port

CCS DC Plug

CCS DC Port

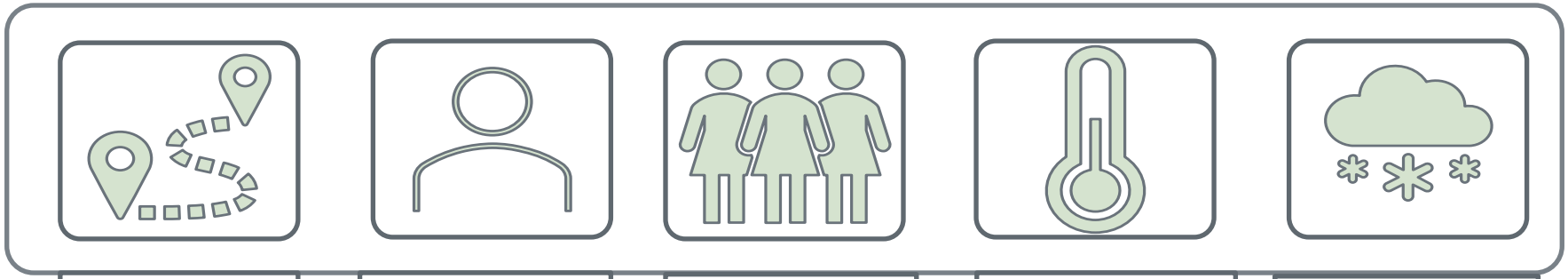
- Considerations
  - Perform a route analysis and understand what size chargers fit your needs
  - Confirm that your bus offers the desired charging level
  - Understand your buses max kW acceptance rate

BEB Considerations

- Benefits
  - High performance- max torque, smooth acceleration
  - Fewer moving parts-little to no maintenance
  - Eliminate diesel exhaust fluid (DEF), engine oil aftertreatment
  - Potential for lower operating costs
  - Zero tailpipe emissions
  - Quieter, less noise pollution

- Challenges
  - Complex planning, requires different decision making
  - Higher upfront costs
  - Different training/maintenance needs
  - Potential negative range impacts

Bus Range



Duty Cycle

- Traffic, average speed, number of stops, terrain

Driver Style

- Aggressive drivers will lower range

Bus Loading

- More weight/riders = less range

Ambient Temp.

- HVAC affects efficiency

Adverse Weather Conditions

- Snow and rain

Clean Transit Bus Technical Assistance

RideElectric.gov

To support electric ridership across the nation's public transportation systems, this page contains information on technical assistance and resources for school districts, transit agencies, and riders of all zero-emission transportation modes.

The Joint Office of Energy and Transportation's (Joint Office's) mission is to accelerate an electrified transportation system that is convenient, affordable, accessible, reliable, equitable, and safe. To fulfill this mission, it is critical that communities across the nation have access to a variety of electrified transportation options, whether it be cars, buses, bicycles, scooters, or shared fleets.

Contact us | Technical assistance

Direct technical assistance for eligible transit agencies to plan for and deploy clean transit buses

Examples of How We Can Help

- Coordinating with electric utilities
- Identifying available funding and incentives
- Analyzing charging infrastructure needs
- Conducting route analysis and planning
- Conducting training and workforce development
- Opportunities for resiliency (V2X)
- Analyzing energy needs and grid impact
- Identifying solar and battery storage opportunities

BIL Programs Supported by the Joint Office

FY 2022-20226

The Joint Office will provide unifying guidance, technical assistance, and analysis to support the following programs:

National Electric Vehicle Infrastructure (NEVI) Formula Program (U.S. DOT)
$5 billion for states to build a national electric vehicle (EV) charging network along corridors

Charging and Fueling Infrastructure (CFI) Discretionary Grant Program (U.S. DOT)
$2.5 billion in community grants for EV charging, as well as hydrogen, natural gas, and propane fueling infrastructure

Low-No Emissions Grants Program for Transit (U.S. DOT)
$5.5 billion in support of low- and no-emission transit bus deployments

Clean School Bus Program (U.S. EPA)
$5 billion in support of electric school bus deployments

In-Depth Electric Transit Bus TA Examples

- **New York Metropolitan Transportation Authority**
- FTA Low-No funded fleet.
- Technical assistance needs:
  - Utilizing existing tools to estimate energy needs and grid impacts.
  - Prioritizing depot locations for installing solar/storage.
  - Controlling thermal issues in bus depots.
- Outcome:
  - *Battery & PV Design, Life-cycle Cost Analysis, Resilience Analysis*
-
- **Northern Virginia Interagency On-Route Charging Planning Assistance**
- New project providing technical assistance to a group of transit agencies to understand and analyze potential for shared on-route charging infrastructure.
- In the data collection phase. Will provide a report on findings of analysis, technology and best practices.

Clean Bus Planning Awards (CBPA) Program Overview

- **Free** technical assistance for comprehensive and customized fleet electrification transition plans for transit and school bus bus fleets.
- Funded by the Joint Office of Energy and Transportation (Joint Office) and managed by the National Renewable Energy Laboratory (NREL).
- Eligible transit fleets generally includes fleets eligible for FTA Low-No funding.
- Applications open on a rolling basis.
- Deployment assistance also available at the completion of the plan, for a period not to exceed 3 years (monthly check in calls, annual plan updates, RFP development, training support etc.)

Learn more and apply

Joint Office of Energy and Transportation

NREL Transforming ENERGY

Electrification Transition Plans - What's Included*?

- Existing fleet baseline analysis
- Vehicle electrification feasibility analysis
- Infrastructure assessment and optimization
- Procurement and project staging
- Financial analysis/modeling
- Emissions analysis/modeling
- Stakeholder analysis
- Workforce considerations
- Recommended next steps

*Plans tailored to the specific circumstances and needs of the fleet.

- Request assistance via online form
- Initial response within 48 hours
- General questions and feedback welcome!

Joint Office of Energy and Transportation

energy.gov | transportation.gov

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Contact Us

Use this contact form to submit a media inquiry, ask a general question about Joint Office of Energy and Transportation resources and activities, or request technical assistance for states, tribal nations, or clean school buses or transit buses.

Required fields are marked with an asterisk (*).

Inquiry type *

Low-No Emissions Transit Vehicle Technical Assistance

Transit vehicle technical assistance is only available for eligible entities currently receiving Low-No funds, planning to apply for Low-No funds, or using other Federal Transit Administration (FTA) program funds for clean transit buses.

Transit funding *

- ☐ Currently receiving Low-No funds
- ☐ Planning to apply for Low-No funds
- ☐ Using other FTA program funds for clean transit buses
- ☐ None of the above

Name *

Email *

Subject *

Message *

Send

LowNoTransitTA@nrel.gov

Joint Office of
Energy and Transportation

Thank You

mike.jones@nrel.gov

driveelectric.gov