REGIONAL EV STRATEGY
Electric School Bus Planning

October 19, 2023

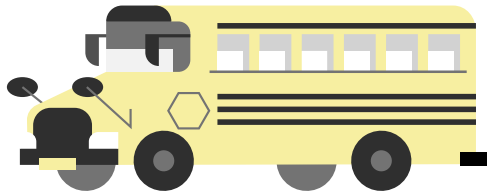
MAPC
METROPOLITAN AREA PLANNING COUNCIL

Today's Agenda

1:00-1:05 p.m.	Welcome	Alison Felix, MAPC
1:05-1:10 p.m.	Overview of School Bus Electrification	Allie Sheppard, MAPC
1:10-1:35 p.m.	Learnings from Weston's Approach to Electric School Bus Adoption Experiences of Municipalities that Own and Operate Electric School Buses	Julie Gagen, Town of Weston Brian Foulds and Eric Simms, Town of Concord Erina Keefe, City of Beverly Cian Fields and Alexandra Oster, Boston Public Schools
1:35-1:45 p.m.	MassCEC's Fleet Advisory Program	Orly Strobel, MassCEC
1:45-1:55 p.m.	MAPC's MetroWest Regional School Fleet Electrification Study	Allie Sheppard, MAPC
1:55-2:15 p.m.	Q&A	Alison Felix, MAPC
2:15-2:20 p.m.	Updates	Emma Zehner, MAPC
2:20-2:25 p.m.	Review of Feedback from Working Group Members	Emma Zehner, MAPC
2:25-2:30 p.m.	Wrap Up & Next Steps	Alison Felix, MAPC

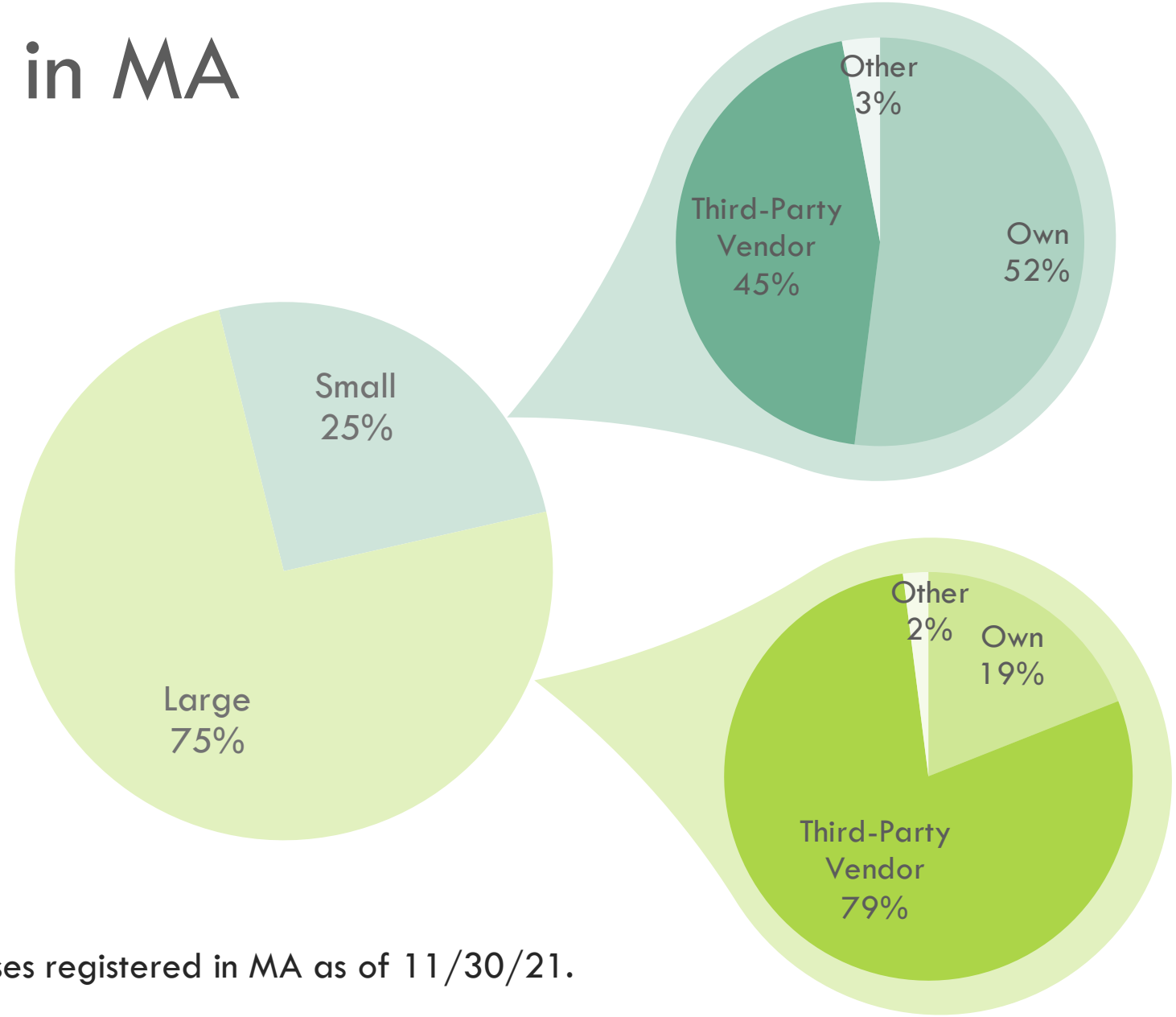
Overview of School Bus Electrification

School Buses in MA



8,260
School Buses

300+ school districts



Source: MassDOT, RMV. School buses registered in MA as of 11/30/21.

Why Electric School Buses (ESBs)?

Health Benefits

- Children spend 20 minutes to several hours a day on school buses
- Pollution levels inside older diesel buses can exceed surrounding by 5-10x (air quality on school buses not regulated by the EPA)*
- ESBs can reduce cumulative pollution burdens, especially in EJ communities

Greenhouse Gas Reduction

- ESBs produce < half of the GHG emissions of diesel school buses

Operations and Maintenance Savings

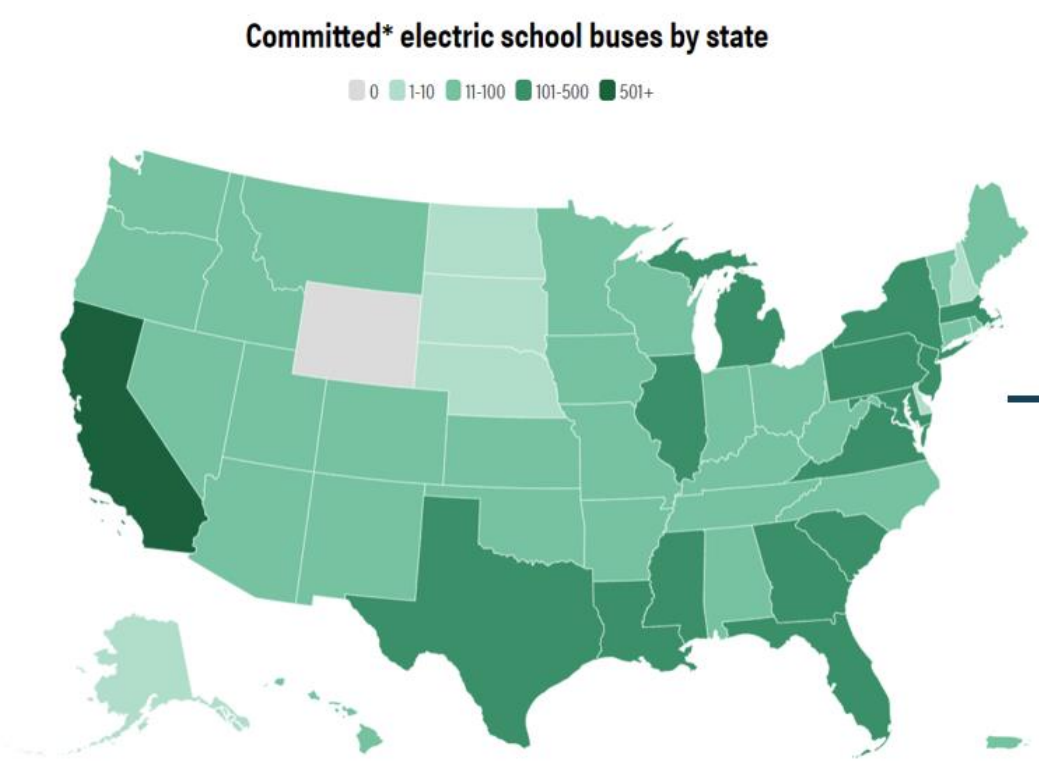
- A new ESB can save schools $6,000/yr in fuel and maintenance costs

Market Movement

- 20+ models available from all major manufacturers**

**Data on this page is from WRI's Electric School Bus Initiative, unless otherwise noted*
*** Mass Clean Energy Center*

ESBs in the US



Electric school buses are operating in every type of community, and nearly 6,000 have been committed to in 49 states, as of August 2023.

Leading state commitments:

- California: 2,078 electric school buses
- Maryland: 391 electric school buses
- New York: 304 electric school buses

Source: Electric School Bus Initiative (WRI)

Learnings from Weston's Approach to Electric School Bus Adoption

Experiences of Municipalities that Own and Operate Electric School Buses

Electric School Buses: Stakeholder Engagement MAPC TAP 2022-23

TOWN OF WESTON

Overview

- Setting the stage: TL;DR
- Background: where we started
- Changed focus to stakeholder engagement
- Learnings from Arlington, Beverly, Concord, Boston
- What comes next:
  - Resources
  - Planning Tools
  - Decision making

Photo credit: Brian Foulds, Concord

Setting the stage: TL;DR

- The State of Massachusetts has committed to selling all-electric consumer vehicles by 2035
  - This commitment provides market certainty
  - We use that certainty to plan actions and steps needed to adapt to a changing market
  - To prepare for this, infrastructure needs to be installed, investments made, new systems started
  - This is complicated and expensive

- Bottom line: Electric Buses are still a new idea; no one has it "figured out"; you're not behind; taking the time to do it right from the beginning will better prepare your community for the transition
- **The purpose of this talk** to provide market realities, offer insights to help your community take proper planning steps to prepare for this technological change, and understand the value / need for stakeholder engagement

Background: Fleet, Climate Action

- The Town of Weston own/operate its bus fleet
  - 33 buses; replace 3 every year, with full fleet turnover every 11 years
  - Current budget: $300k-$350k per year
  - Community is interested in electric buses
  - Decisions are always made with analysis, technical support, research
- Climate Action & Resilience Plan – 2021
  - 30% of all GHG emissions in Weston are a result of transportation
  - Goal: Full fleet electrification by 2035

WESTON AHEAD
Creating our Sustainable Future

Background: Stakeholders, TAP Grant

- Weston Awarded MAPC technical assistance grant in May 2022
  - Support procurement of electric bus
  - Applied for EPA grant for our first bus
  - Change in Scope: staff changes, did not receive EPA grant
  - Worked internally with staff to revise scope and begin this process

- **Revised MAPC TAP Grant**: internal/external stakeholder coordinated education and engagement program to support bus fleet electrification in the Town of Weston

- Understanding Stakeholders: Internal, External
  - Internal: DPW, School Administration, School Department staff that manage day to day fleet operations
  - External: School Committee, with Superintendent + Admin, decides school related budget
  - External: Sustainability Committee, under Select Board, is responsible for implementing the Climate Action Plan
  - Town Meeting: every decision related to finances must be voted on in Town Meeting

Stakeholder Feedback/Concerns

- Starting out: Internal stakeholders / DPW staff very skeptical
  - Heavy skepticism on the performance of heavy-duty EVs, reliability, technological readiness, etc.
  - Towns are slow to change
  - Pushing forward, without addressing that skepticism, makes it difficult to make the systemic change we need to electrify our full fleet
  - Bringing them on board was essential to decision-making

- Schools: Cost is a major concern
  - Electric buses cost approximately 3x standard engine buses (gas / diesel)
  - Plus cost to build charging infrastructure
  - As a community funded primarily through residential taxes, it's important to weigh cost / benefits and develop a realistic/ achievable plan
  - Funding is limited: Weston is not a priority community, thus not eligible for most of the federal funding for electric buses. This puts a larger strain on the tax base

Photo credit: Brian Foulds, Concord

Stakeholder Engagement

- Internal/External Stakeholders brought together
  - Internal, Schools: Transportation Coordinator, School Business Manager, School Asst. Superintendent of Finance & Operations
  - Internal, Town: DPW, Asst. DPW Director, Town Procurement Officer, DPW Maintenance staff, Sustainability Coordinator
  - External, Schools: School Committee member
  - External, Sustainability: Sustainability Committee member
- Interviewed 4 Communities: Concord, Beverly, Arlington, Boston

Photo credit: Brian Foulds, Concord

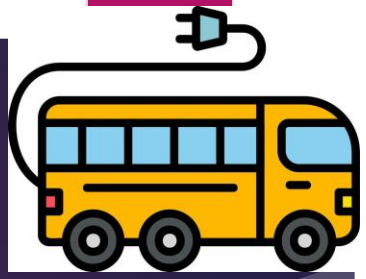
“Coming together is a beginning.
Keeping together is progress.
Working together is success.”

- Henry Ford

Learning from communities farther ahead in this process:

Interviews with Concord, Beverly, Arlington, and Boston

Municipality: Concord



Electric School Bus Model: School District Ownership, Maintenance and Operation

Electric Buses in Fleet/Total # School Buses: 3 ESB & 39 DSB = 42 Buses

Project Start Date: Nov. 2016 (First mass-produced ESB in the US)

Key Challenge: Every challenge you can imagine and more. Vehicle colors/labels, Wheelchair braking system, community expectation setting, mechanical issues, depot infrastructure and many other early adopter issues now resolved. Operating for 6 years, with 2.5 years issues free.

Success or Win: We took a risk in 2016 on a new school manufacture with new technology and in 2020 and 2022 we added to our ESB fleet. Each funded under different programs with all operating today. The community love them but is unwilling to buy without help reducing the upfront purchase price. The goal is an 80% ESB fleet with V2G changing in partnership with Concord Light.

Photo credit: Brian Foulds, Concord

Municipality: Beverly

Electric School Bus Model: Charging-as-a-Service / Lease (buses 1&2); Lease to buy (buses 3-5)

Electric Buses in Fleet/Total # School Buses: 5 Electric; 48 total (22 full size)

Project Start Date: October 2020

Key Challenge: Affordability; operational issues

Success or Win: First Vehicle-to-Grid school bus!

Photo credit: WBUR Coverage of Beverly Schools Announcement of ESBs – 1/23/23 https://www.wbur.org/news/2023/01/23/massachusetts-electric-school-buses

Municipality: Arlington

Electric School Bus Model: Thomas Saf-T-Liner C2 Jouley

Electric Buses in Fleet/Total # School Buses: 2 electric /13 total buses, 4 student transport vehicles

Project Start Date: October 2021

Key Challenge: Charging infrastructure – equipment delays, supply chain issues, utility coordination, siting of chargers; grant and rebate layering

Success or Win: Nearly $1M in grants and rebates secured, busses officially up and running as of Sept 2023

Arlington Sustainability Manager Talia Fox, MA State Representative Sean Garballey, Arlington Public Schools (APS) Superintendent Dr. Elizabeth Homan, and MA State Representative Dave Rogers at the electric bus ribbon cutting event. https://www.arlingtonma.gov/Home/Components/News/News/13606/16

Municipality: Boston

Electric School Bus Model: City owned, operations and maintenance contracted out

Electric Buses in Fleet/Total # School Buses: 20 Electric / 750 total (620 buses on the road daily)

Project Start Date: May 2022 kickoff (Buses active since February 2023)

Key Challenge: PRICE and school bus interoperability with software (eg, scheduled charging, pre-conditioning, and telematics)

Success or Win: Solid reliability and cold weather performance

Photo credit: WBUR Coverage of BPS Announcement of ESB Pilot 20 buses – 2/6/23
https://www.wbur.org/news/2023/02/06/boston-electric-school-bus-pilot-program

“Cooperation is the thorough conviction that nobody can get there unless everybody gets there.”

- Virginia Burden, Author

Weston’s Conclusions, Next Steps, Resources

Weston's Conclusions

- Municipalities need a whole-house approach
  - Prioritizing planning: true cost, infrastructure, investments needed
  - Bring all stakeholders to the beginning of the conversation
  - Let concerns be known and work to provide opportunities to address those concerns in a palatable way
  - Network: Talk with other communities + learn from them

- This isn't about buying an electric vehicle, it's about long-term conversion of a fleet
  - Changing fuel type and related infrastructure for an asset
  - Staff training, clear budgeting, understanding true cost
  - Change in allocation of funds

Photo credit: Brian Foulds, Concord

Weston's Approach to Bus Fleet Conversion

- 2022-2023 MAPC Grant – Interviews, research, gathering information
- Fall 2023: Power Options Fleet Planning Process (Free)
  - Includes vehicle-by-vehicle analysis
  - Infrastructure planning w/ Utilities
  - Total cost is approximately $12M over 10 years; $2M initial investment
- November 2023: Present to Weston School Committee
  - Coordinate internally with staff (requests from DPW, Bus Director, School Finance Director, etc.)
  - Provide information, recommendations, data, analysis
  - Stakeholder engagement comes BEFORE anything is finalized
- January 2024: Apply for EPA Bus Grant
- Spring Town Meeting 2024: Sustainable Fleet Policy proposed/voted on

Photo credit: WBUR

“The only way to do the impossible is to believe it is possible.”

- Alice in Wonderland

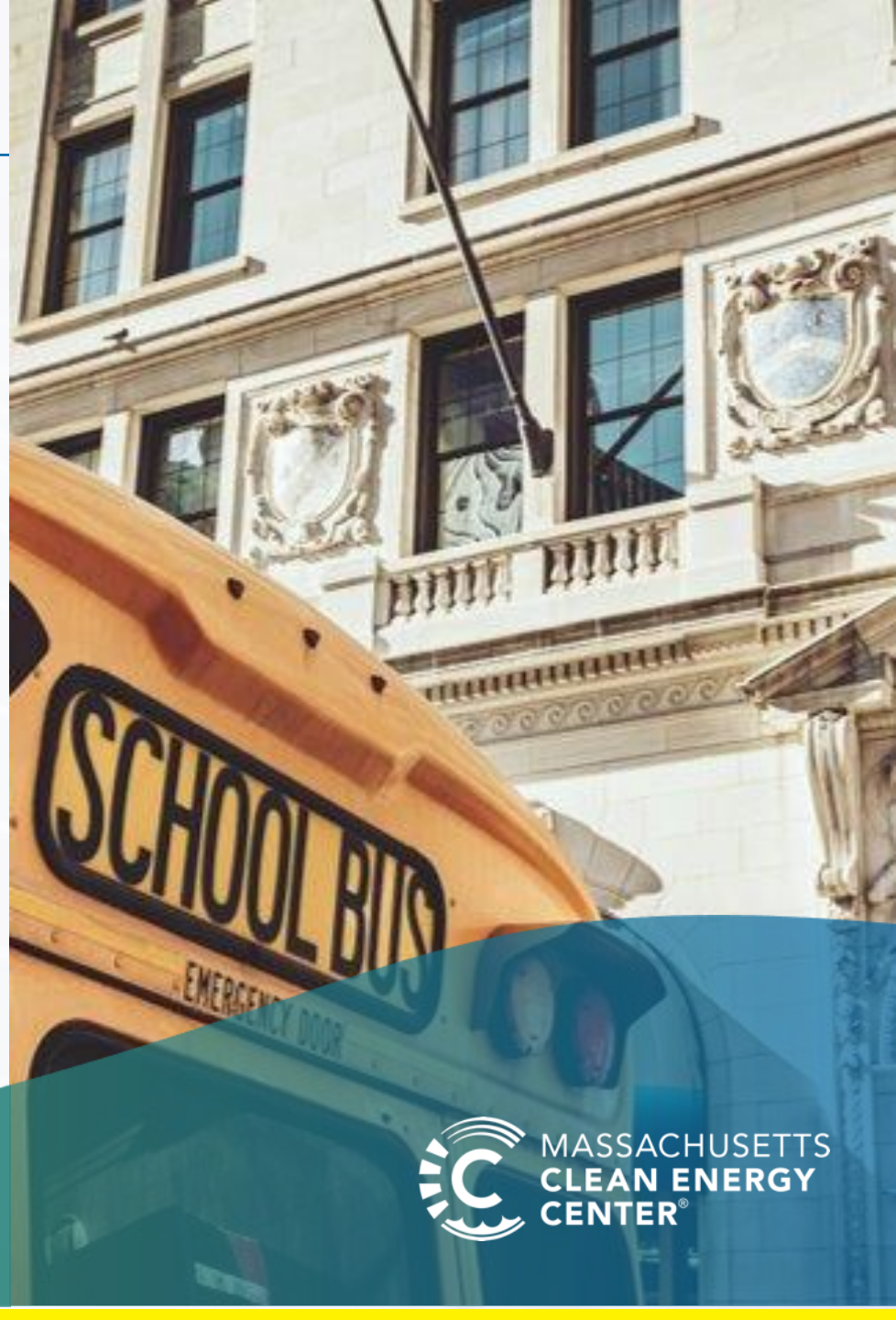
MassCEC's Fleet Advisory Program

October 19, 2023

School Bus Electrification:

Massachusetts Landscape

ORLY STROBEL, MASSCEC



MASSACHUSETTS CLEAN ENERGY CENTER®

Massachusetts Clean Energy Center

High Performance Buildings

Clean Transportation

Net Zero Grid

Offshore Wind

State economic and development agency that seeks to accelerate Massachusetts' clean energy and climate goals

Barriers to Electrification

Upfront Costs:

- Electric school buses are 2-4 times the cost of a diesel bus
  - $250 - $400k
- Necessary charging stations + electrical upgrades add significant cost

Project Complexity:

- Multiple stakeholders – utility, 3rd party operators, vendors and OEMs
- New procurement processes, grant funding requirements
- Operational differences (charging vs. fueling)

Overcoming Barriers in the Commonwealth

Managing Upfront Costs

- Funding opportunities may cover the upfront cost of electric school buses and can help infrastructure upgrade costs
  - EPA, MassCEC funding
- Turnkey and electrification-as-a-service options

Breaking Down Project Complexity

- Talk to utilities early and look for programs like Make-Ready
- Technical Assistance from vendors, manufacturers, the World Resources Institute, MassCEC
- Turnkey and electrification-as-a-service options

Massachusetts ESB Landscape

ESBs in Massachusetts

- 120+ ESBs operating or procured in Massachusetts
- 10+ school districts have deployed or are in the process of deploying ESBs
- 50% leased, 50% owned and operated
  - 3 to 5-year contracts with fleet operators
  - Some electrification-as-a-service contracts of 10+ years

ACT School Bus Advisory Services

- **Free Fleet Electrification Planning Program**
  - Support for up to **25** school bus fleets (Cohort includes Boston)
  - Includes preparing districts to access additional funding opportunities like **EPA Clean School Bus**
  - Feasibility designs, financial models, procurement plan
    - Currently in early stages of enrollment
    - Consultant: **VEIC**

Eligibility and Prioritization

- School districts OR 3rd party school bus fleets (in partnership with school districts) may directly apply to receive advisory services
- EPA Priority Districts and 3rd party school bus fleets partnered with Priority Districts will be given preference in enrollment
- Goal of geographic and ownership model diversity

Current Advisory Services Program Status

- **4** school districts enrolled, at least **6** slots filled
  - Boston (3 slots)
  - Mashpee (2 slots)
  - Springfield (1 slot)
  - Worcester (TBD)
- **40%** of 2023 EPA Rebates will be awarded to non-priority districts. **Advisory Services enrollment will reflect this change**

Each of the 25 school district fleets will receive a customized fleet electrification plan and hands-on assistance from a team of experts

MAPC's MetroWest Regional School Fleet Electrification Study

Goals of the MetroWest Regional School Fleet Electrification Study

1. Understand the current school bus landscape (e.g., fleet sizes, bus ownership models, infrastructure)
2. Map potential electrification pathways
3. Study the financial, operational, logistical, political, and equity barriers and opportunities of electrifying school buses
4. Consider opportunities for regional collaboration, including shared infrastructure and public-private partnerships

Participating School Districts

Acton-Boxborough

Ashland

Concord-Carlisle

Dedham

Dover and Sherborn

Framingham

Harvard

Holliston

Hopkinton

Lexington

Lincoln

Marlborough

Medfield

Millis

Natick

Needham

Northborough and Southborough

Wayland

Wellesley

Westborough

Weston

Westwood

Goal 1: Understand the Current School Bus Landscape

MAPC created a survey for the 22 MetroWest school districts to provide information about:

- The numbers of buses and students transported
- School bus ownership models
- Locations and ownership of bus depots
- Average age of school buses
- Regional collaboration
- And more!

Characteristics of Study Participants

22

School Districts

707

School Buses

83

Students per Bus per day (multiple trips)

51,300

Students Transported

93

Environmental Justice Block Groups

12

Communities with Climate Action Plans

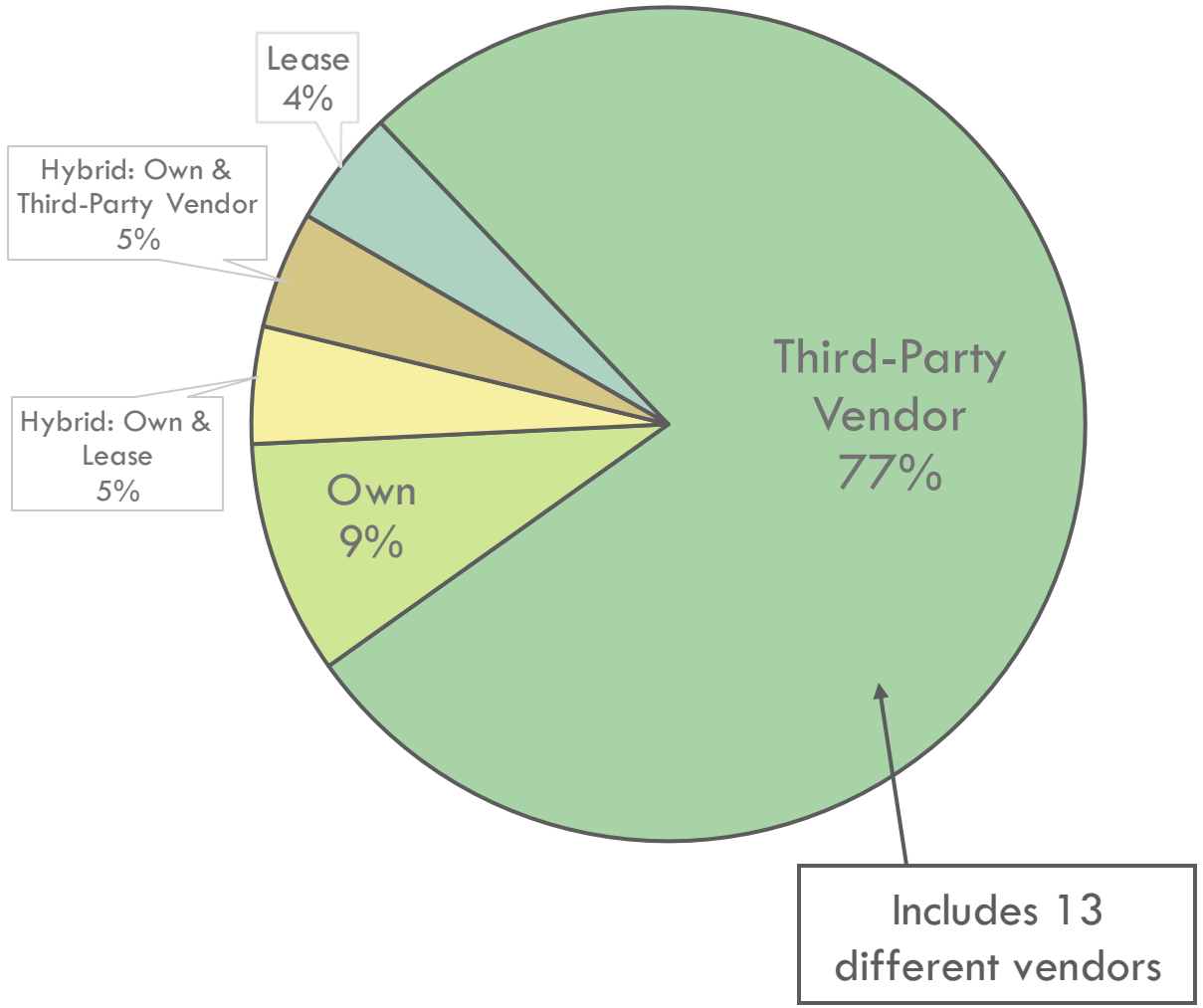
Survey Results: Ownership Models

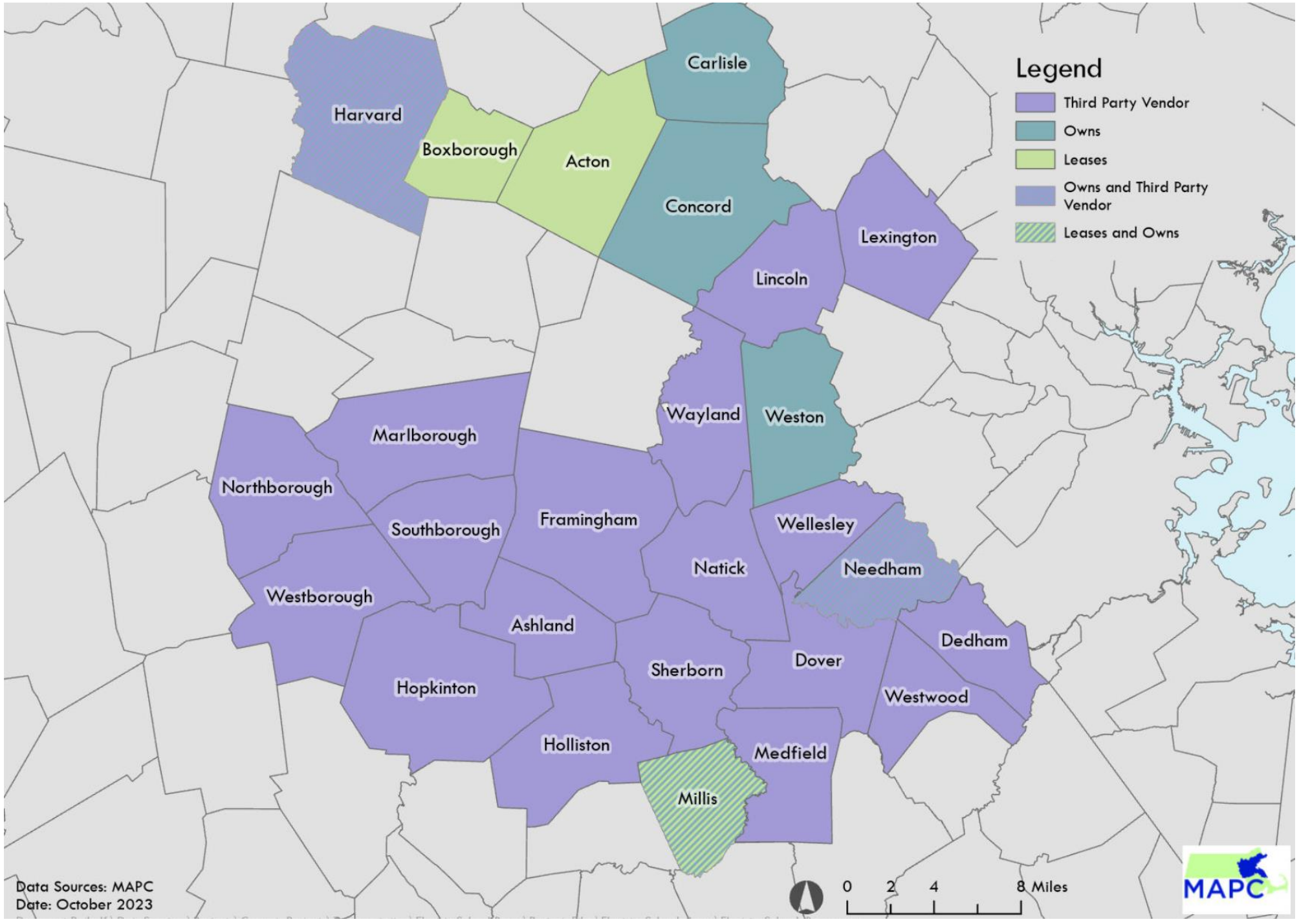
Definitions:

Own: School District/Municipality obtains buses through a direct upfront purchase and owns, operates, and maintains vehicles

Lease: School District/Municipality obtains buses through a commercial lease and operates and maintains the vehicles

Third-Party Vendor: School District/Municipality contracts with a third-party vendor who owns, operates, and maintains the vehicles




Legend
Third Party Vendor
Owns
Leases
Owns and Third Party Vendor
Leases and Owns
Harvard
Boxborough
Acton
Carlisle
Concord
Lexington
Lincoln
Wayland
Weston
Marlborough
Northborough
Southborough
Framingham
Wellesley
Natick
Needham
Westborough
Ashland
Sherborn
Dover
Dedham
Hopkinton
Westwood
Holliston
Medfield
Millis
Data Sources: MAPC
Date: October 2023
0 2 4 8 Miles
MAPC

Survey Results: Location & Ownership of Depots

Majority of buses are stored in open-air parking lots

11 municipalities
own all of the parking lots

9 municipalities
do not own some or all the parking lots
(owned by vendor, leased from private businesses, etc.)

Survey Results: Regional Collaboration

Most school districts are interested in and open to the idea of sharing infrastructure and/or vehicles with nearby school districts…

…but expressed concerns about the feasibility:

All schools need buses at the same/similar times.

How would the costs be shared and adequately budgeted?

State and federal law may not allow regional transportation arrangements.

We don't own and don't want to own our buses.

That would be challenging to sell to our school committee.

Next Steps

- Meet with electric school bus industry experts to document best practices and electrification pathways
- Convene meetings with third-party vendors to understand prospects and timelines of electric fleet adoption
- Engage with the electric utilities to discuss EVSE deployment
- Explore procurement challenges and solutions and ownership, operation, and maintenance models
- Identify candidate sites for infrastructure sharing and site suitability
- Research funding opportunities (e.g., EPA grant/rebate program)

Q&A

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Updates

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EPA Clean School Bus Rebate Program

- Round 3 will provide at least $500M in rebates awarded to applicants nationwide.
- Approximately 60% of funds are set aside for priority districts, with the remaining 40% allocated to non-priority districts.
- Application Requirements Include:
  - School Board Awareness Certification
  - Utility Partnership Agreement
  - Active SAM.gov Registration

- **Application Deadline: January 31, 2024, at 4:00pm (ET)**
- Application Details: https://www.epa.gov/cleanschoolbus/clean-school-bus-program-rebates

EPA CLEAN SCHOOL BUS

Source: https://www.epa.gov/cleanschoolbus

Federal Funding for EV Charger Repairs

- DOE's database shows 4.1% of public charging ports are "temporarily unavailable" (power issues, routine maintenance, etc.)
- $100 million to fix broken chargers, funding from BIL
- **Local governments** and state transportation departments are eligible to apply
- 20% local match
- **Deadline: November 13, 2023**
- **To be eligible, chargers must:**
  - already exist;
  - be publicly accessible (not privately owned);
  - be a Level-2 or Direct Current Fast Charger; and
  - be listed by the Alternative Fuel Data Center (https://afdc.energy.gov/stations#/find/nearest?fuel=ELEC)

Details: Apply Now: Federal Funding Available for Local EV Charger Repair - National League of Cities (nlc.org)

Source: FHWA Offers $100 Million in Grants to Fix Broken EV Chargers | Transport Topics (ttnews.com)

National E-Mobility Diversity, Equity and Inclusion Conference

- **Virtual October 25, In-Person October 26**
- Focused on strategies for eliminating barriers to equitable access to e-mobility
- Sessions focused on electrifying rideshare and delivery networks, e-mobility workforce and economic inclusion, young leaders in e-mobility, e-mobility beneficial policy & federal investments
- Virtual Only Sessions **Free** for Academic, Government, and 501c3 attendees
- Register: https://www.eventbrite.com/e/national-e-mobility-diversity-equity-and-inclusion-conference-2023-tickets-673283247317?aff=oddtdtcreator

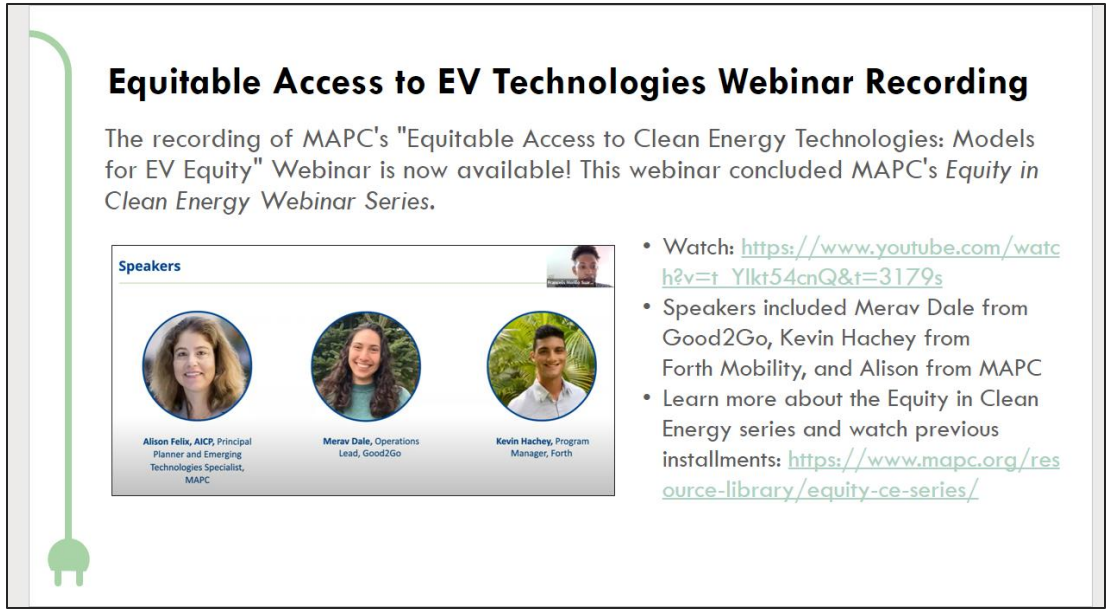
NATIONAL
E-MOBILITY
DIVERSITY, EQUITY AND
INCLUSION CONFERENCE

Boston Launches E-Cargo Bike Pilot

- September launch in Allston with potential to expand
- Responding to increasing delivery service congestion due to COVID
- The City will subsidize delivery costs for up to 8 businesses
- Funded through Mass CEC Accelerating Clean Transportation for All Program
- City will use pilot to test infrastructure changes needed to accommodate e-cargo bike delivery and measure environment, safety, and economic benefits
- Learn more: https://www.boston.gov/news/mayor-wu-announces-boston-delivers-e-cargo-bike-delivery-pilot-program

Equitable Access to EV Technologies Webinar Recording

The recording of MAPC's "Equitable Access to Clean Energy Technologies: Models for EV Equity" Webinar is now available! This webinar concluded MAPC's *Equity in Clean Energy Webinar Series*.



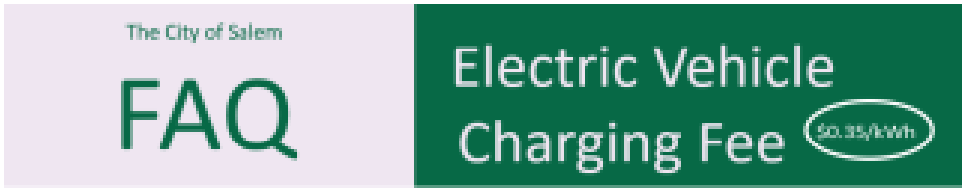
- Watch: https://www.youtube.com/watch?v=t_Ylkt54cnQ&t=3179s
- Speakers included Merav Dale from Good2Go, Kevin Hachey from Forth Mobility, and Alison Felix from MAPC
- Learn more about the Equity in Clean Energy series and watch previous installments: https://www.mapc.org/resource-library/equity-ce-series/

Pilot Uses Vehicle-to-Grid Charging to Make EV Rentals More Accessible to Affordable Housing Residents in Dorchester

- Low-cost monthly rentals for residents of CSNDC's Girls Latin Apartments in Dorchester
- Goal: lower costs of an EV for a driver and eliminate costs for affordable housing developments to host charging infrastructure
- Codman Square Neighborhood Development Corporation, Blue Hub Capital, Enterprise Rentals, Fermata Energy
- Resident use car whenever except peak power demands in summer when has to be plugged into charger
- Bidirectional charger can charge an EV battery and release electricity from battery, utility pays pilot for electricity, can be used to cover costs ($3000/year through Eversource's Connected Solutions Demand Response Program)

Source: https://www.enterpriseholdings.com/news-stories/news-stories-archive/2023/09/pilot-for-affordable-access-to-evs-launched-in-boston.html

Salem to Start Charging at Publicly Accessible Charging Stations



- Starting tomorrow, the City of Salem will charge a $0.35/kilowatt fee for charging at all publicly accessible EV charging stations
- The fee will help to offset costs of charging station ownership, network plans, and maintenance
- Separate from municipal parking fees
- Other municipalities that already implement a price per energy protocol for public EV charging include: Arlington, Beverly, Boston, Cambridge, Medford, Melrose, and Swampscott
- Learn more: https://www.salemma.gov/home/news/city-salem-electric-vehicle-charging-fee-faq#:~:text=What%20are%20some%20questions%20that%20might%20come%20up%20regarding%20this%20new%20policy%3F&text=Beginning%20on%2010%2F20%2F2023,vehicle%20(EV)%20charging%20stations.

Review of Feedback from Working Group Members

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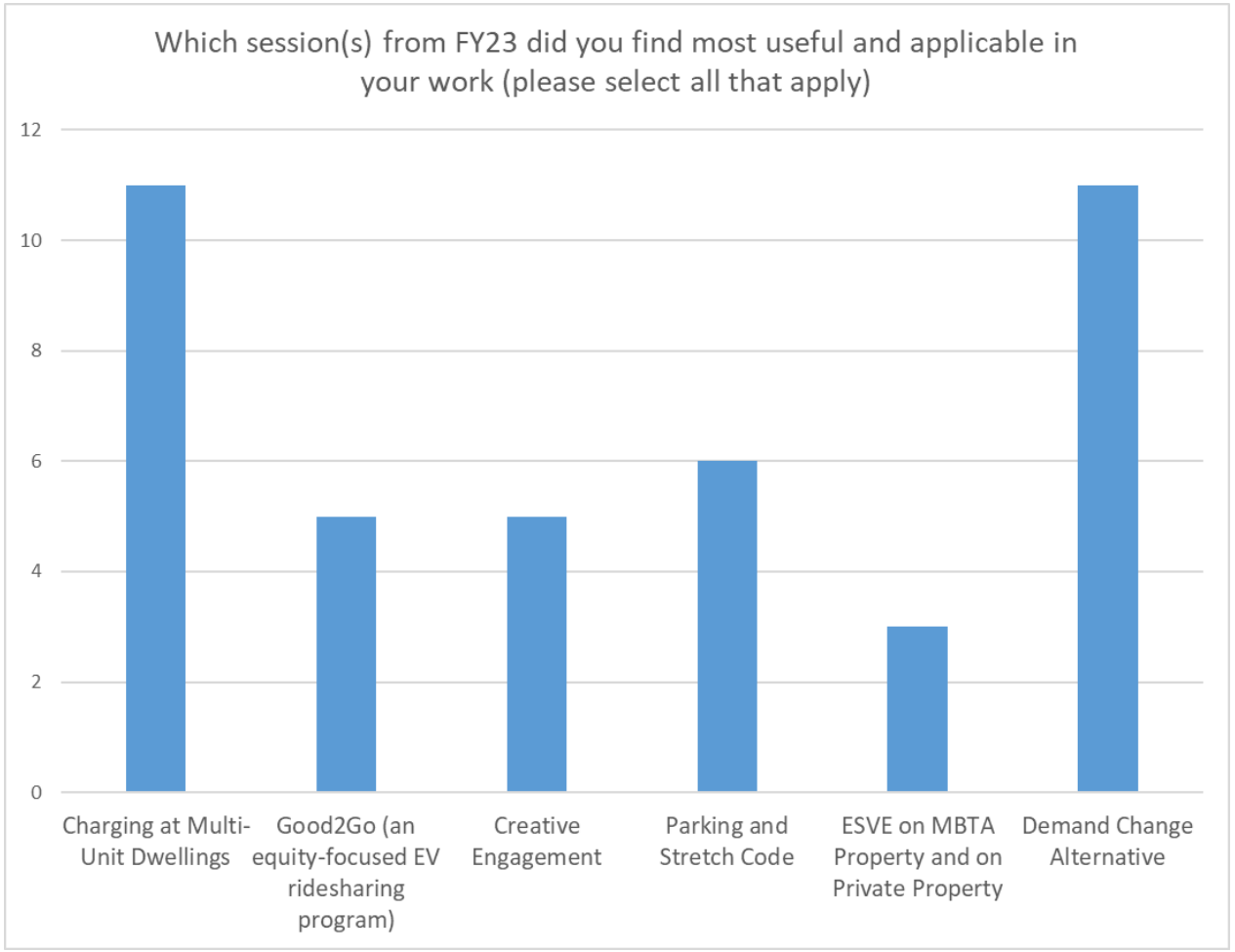
Content:



Whose voices are missing?

- **Private companies:** EVSE manufacturers and installers, bus leasing companies, local vendors offering EV products & services
- **Specifically BIPOC WBE and DBE providers of EV charging services** (may not be well known in the industry but should be given opportunity to present businesses)
- **EV dealerships and Local Auto Dealers**
- **MUD representatives**
- **Fleet Managers**
- **Workforce**
- **Utility EV Infrastructure Experts** (big picture - what's the pipeline and timeline for new service, what does it take to advance new service requests? We're hearing about 1 year)
- **Advocates for Transportation Equity**
- **Companies with EV benefit programs for employees**

Content:

What topics would you like to see?

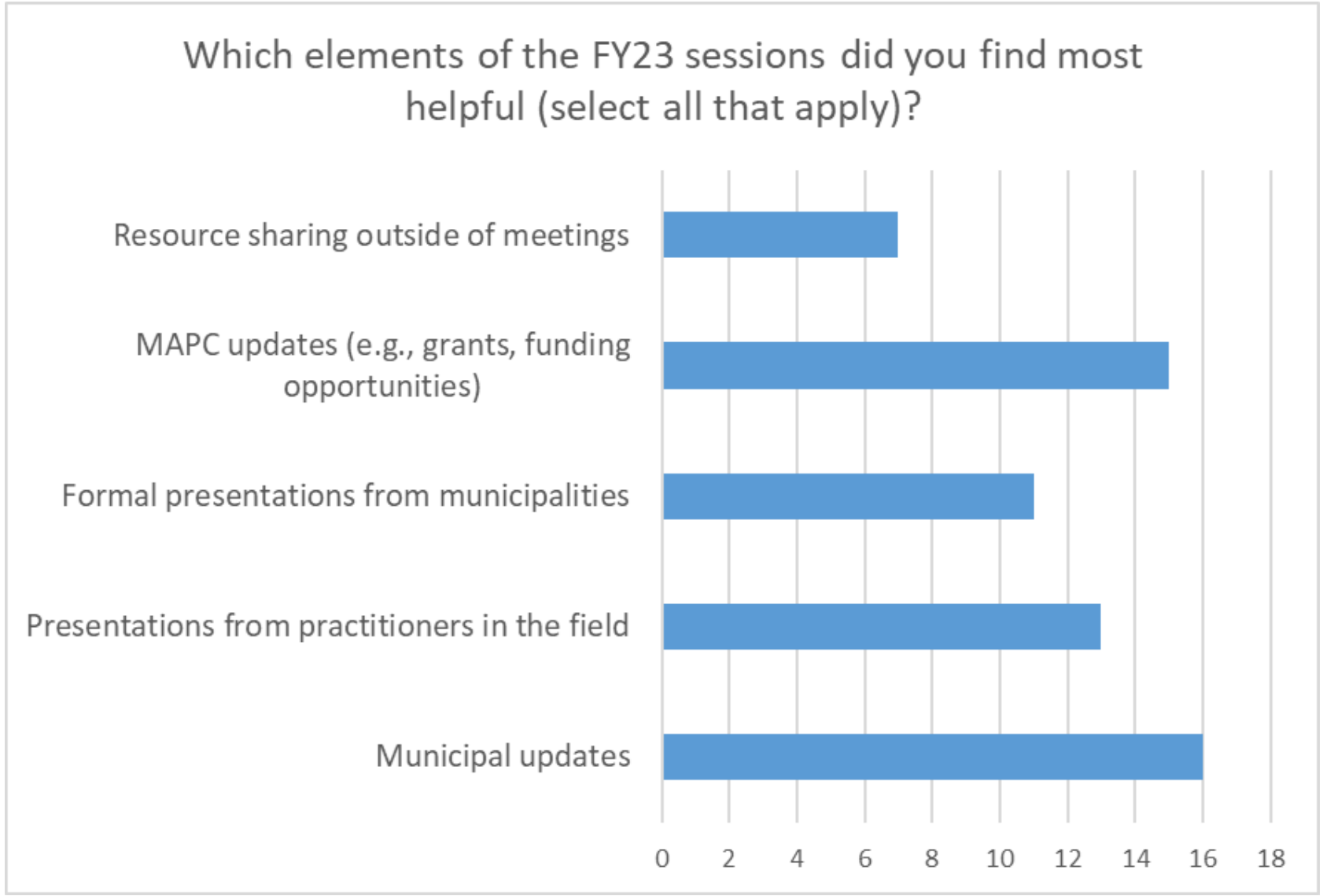
- **Group procurement of EVSE**
- **Regional collaboration on EVSE charging**
- **Medium duty/Heavy duty Vehicles:** electric refuse trucks, Cambridge, NY Sanitation
- **Fleet Assessment Programs**
- **Fire Safety**
- **Pole and Curbside Charging**
- **Marketing and Outreach:** Signage best practices, incentives awareness and marketing, equitable outreach
- **EV Charging at Commercial Developments**
- **E-Cargo Bike Program**
- **Charging at Multiunit Dwellings**
- **Federal Programs Overview**
- **Mass Legislative Impediments Overview**

Response to Feedback:

Tentative FY24 Agenda

Month	Topic
December	Private Sector Models for EV Charging, Rate Setting
February	EVICC Update, Legislative Discussion (Right to charge), and Long-Term Projections
April	Medium and Heavy-Duty Trucks, Fleet Assessment
June	Workforce Perspective: Equity, Challenges, and Solutions
August	Equitable Outreach and Education about EVs and/or MUD Charging

Feedback on Format:



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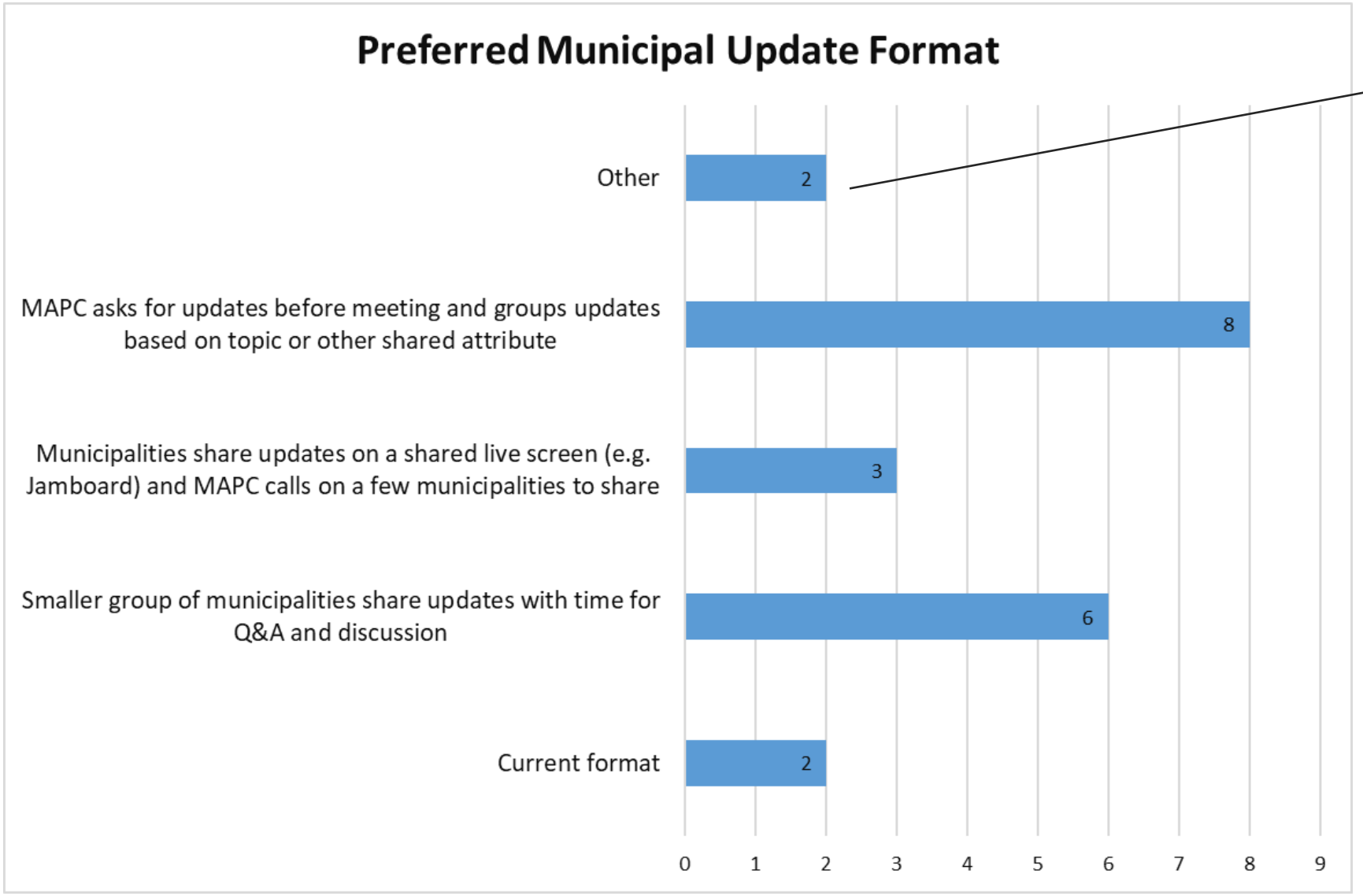

"It would be great if a short list were created afterward with the updates from each and the contact person. This would make the information-sharing component of the meetings most useful and encourage further collaboration."

"Identify municipalities that have shared attributes and invite them to expand upon their update."

Plans to Address Feedback:

- MAPC asks for successes, challenges, or questions ahead of meeting.
- MAPCs groups responses by topic and asks one municipality within each theme to share.
- MAPC shares a full list of updates after the meeting with contact information (we will ask about sharing contact info in the survey to make sure it's okay)

We are looking forward to the October 19 working group meeting. Based on feedback from working group members during our last meeting and through the survey, we are trying a new approach to the "municipal updates" portion of our meetings. **Please use the space below to provide any updates—successes, challenges, or questions by Tuesday, October 17.** We will group the updates based on theme and ask a few people to share on each theme. After the meeting, we will circulate the full list of updates with contact information for those who submitted the updates. We hope this new format will encourage ongoing exchange between communities during our meetings and in between our meetings!

Please share any recent successes, challenges, or questions related to EV planning in your community.

Wrap Up & Next Steps

Next Meeting in December – date and agenda TBD

If you aren't already on our invite list, please email **ezehner@mapc.org** to be added for future meetings

MAPC
METROPOLITAN AREA PLANNING COUNCIL