

Electric Vehicle Infrastructure Coordinating Council (EVICC) Meeting

April 2, 2025



Agenda

Opening

- Roll call, note on meeting minutes, meeting agenda, objectives
- Administrative Updates

Public Comment

Updates

- MassDOT Update
- MassCEC V2X and Ride Clean Mass Charging Hubs Program Updates

Discussion

- Overview of Detailed Outline for EVICC Assessment Sections
- Guided Discussion on EVICC Assessment Sections

Educational Presentations / Discussions

Presentation of Initial Technical Analysis and Managed Charging Information

Public Comment



Meeting Objectives

- Learn about MassDOT charging deployment and MassCEC innovative charging programs
- Review and discuss detailed outlines for sections of the second EVICC assessment
- Learn about Synapse's analysis on the potential of managed charging

Disclaimer: The EVICC team invites presenters to speak about topics of interest to EVICC members and to the development of the second assessment to the Legislature. The Commonwealth is not endorsing any particular company or organization.





- New A&F EVICC member
- Reminder of public hearings
- Vote to adopt bylaw updates
- Update on EJ Siting Guide



Rules for Presentations / Public Comment

Presentations

- Presenters should keep to the assigned time
- The EVICC Chair will allow questions from EVICC members first and then the public if time remains

Public Comments

- Use the "raise hand" function to indicate your desire to speak at the appropriate time
- Identify yourself and affiliation prior to commenting
- Limit comments and questions to 3 minutes
- Please engage in constructive and respectful dialogue
- Be able to substantiate assertions or claims in support of comments



Public Comment



Updates

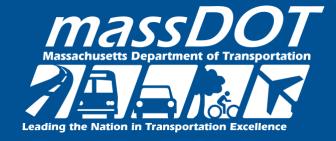




MassDOT EVSE Program Update April 2, 2025



NEVI



NEVI: What is it?

- NEVI is short for the National Electric Vehicle Infrastructure Formula Program.
- It was established by the Bipartisan Infrastructure Law (BIL) which was signed by President Biden on November 14, 2021
- NEVI provides funding to states to build electric vehicle (EV) charging infrastructure
 - Stations every 50 miles (or less) on AFCs
 - Capable of charging at least 4 EVs at 150kW simultaneously
 - Reliable: 97% uptime



Project Progress Timeline (June 2024-March 2025)

June

 Massachusetts begins updating the NEVI Plan.

July 2024

 Massachusetts Adopts a 'Segment Analysis' Methodology for Implementing sites of AFCs;

August 2024

 Early action sites were identified based on speed to market;

 Additionally, sites are solicited from each of the Developers on all segments;

September

2024

- SSTO Proposals Requests issued for Early Action Sites;
- Developers send a list of locations for segments and begin Pre-Development on Round 1 assigned sites;
- Concurrent NEPA process for Early Action Sites;

October

2024

- Sites are solicited from each of the developers on segments with no sites.
- MassDOT owned sites and MBTA sites on segments were also provided to Developers for Pre-Development Services.
- Round 2 Pre-Development Services begin.

November

2024

- All Pre-Development Services from Round 1 and Round 2 are received and reviewed.
- SSTO Proposals for selected Round 1 sites solicited.
- Concurrent NEPA work for Round 1 Sites in SSTO stage;
- NEPA for Early Action Sites Complete.

December

2024

- SSTO Proposals for Round 2 Sites Solicited:
- Concurrent NEPA work for Round 2 Sites in SSTO stage.

January

2025

- All SSTO Proposals due;
- SSTO Proposals under Review.

February

2025

- Additional SSTO proposal issued;
- SSTO Proposals
 Received under review and preparing for LNTP.
- 5 SSTOs were reviewed and recommended for LNTP by AECOM

March

2025

- LNTP Approved for 5 sites
- Alltown I-495 B in Wrentham by Global
- Starbucks & Chipotle I-195 B (East) in Wareham by Applegreen
- The Point I-495 E in Littleton by Applegreen
- Starbucks/Chipotle Rt 2 A in North Adams by Applegreen
- Johnny Appleseed Plaza Rt 2 E in Lancaster by W&S

Legend:

AFC - Alternate Fuel Corridors

MBTA – Massachusetts Bay Transportation Authority

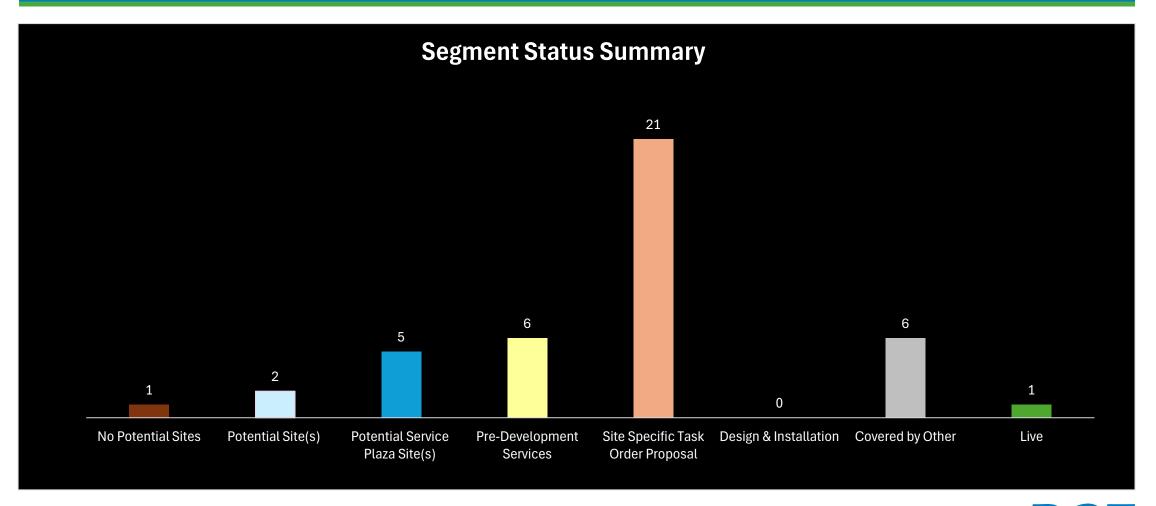
NEPA – National Environmental Policy Act

NEVI - National Electric Vehicle Infrastructure

SSTO – Site Specific Task Order Proposals

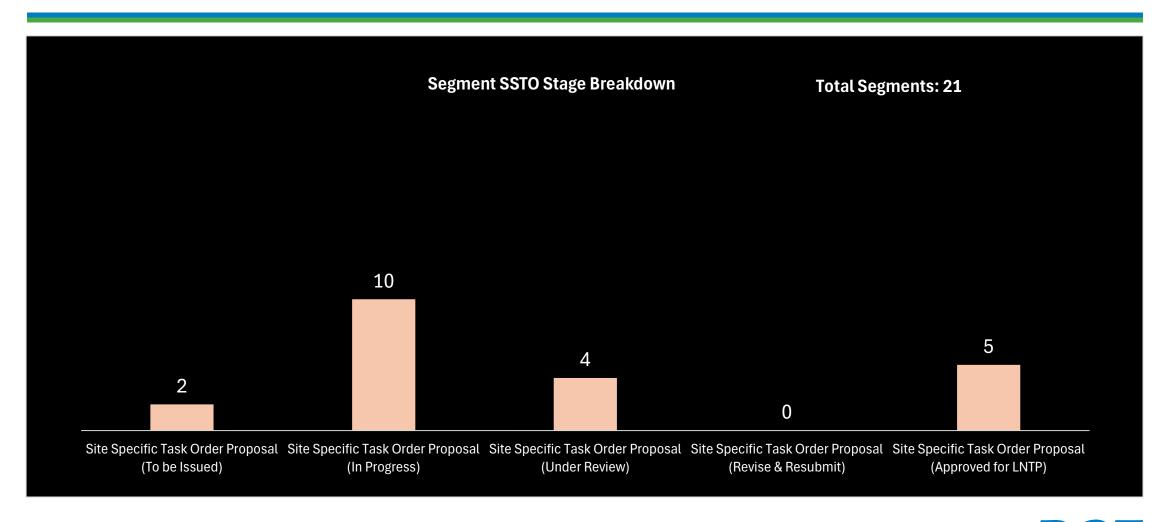


Segment Status – As of March 2025





SSTO Status - As of March 2025





Segment Status Map – As of March 2025 REVERE 1-93 B Rt 3 C 1-95 D LAWRENCE 1-91 C CHARLEMONT Rt 2 C Rt 3 D GLOUCESTER Rt 2 D 1-495 E 1-93 C FITCHBURG Rt 2 E BOSTON 1-93 A 1-93 B 1-495 D 1-91 B 1-95 B QUINCY MILTON 1-90 E DEDHAM 1-90 A 1-290 BRAINTREE Rt 3 B WORCESTER 1-90 D 1-90 B 1-90 C 1-495 C Rt 3 B 1-95 A BROCKTON 1-91 A 1-395 Rt 24 B US 6 C 1-495 B Rt 3 A 1-495 A PLYMOUTH No Potential Site(s) - 1 Potential Service Plaza Site(s) - 5 Pre-Development - 6 Live - 1 - I-195 A Rt 24 A Potential Site(s) - 2 Covered by Other - 6 US 6 A (6) US 6 B Site Specific Task Order - 21 Sites in SSTO Stage NEW BEDFORD I-195 B

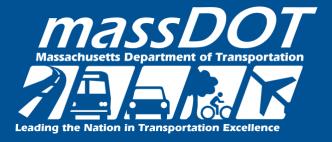


Source: MassGIS, MassDOT, USDOT HEPGIS

March 2025



Service Plazas



Service Plazas: EVSE Update

- MassDOT service plazas are operated by tenants.
- Current leases begin to expire on 12/31/2025.
- MassDOT launched procurement process for next operator in September of 2024, with selection expected Spring 2025.
- MassDOT is seeking a robust and continuous EVSE buildout by next operator during lease term.
- MassDOT will be making some interim EVSE upgrades in 2025.



Service Plaza Contract EVSE Requirements*

Passenger Vehicles:

Year 1 (2026): Robust buildout of EVSE at 8 Mass Pike Service Plazas

• Framingham, Natick, Ludlow (EB & WB), Blanford (EB & WB), Lee (EB &WB)

Year 2 (2027): 4 NEVI level chargers at remaining Service Plazas

Longterm: Continuous upgrades to meet demand based upon utilization rates

MDHD:

Year 1 (2026): Minimum of 2 MD/HD charging stations in each direction on Mass Pike

Longterm: Continuous upgrades based on utilization rates





ThankYou







MassCEC V2X Demonstrations Program

Program Overview:

- \$6.3M grant awarded to deploy demonstration V2X charging systems across Massachusetts in 2025-2026
- Deployment of up to 100 V2X charging systems across vehicle classes and use-cases
 - Residential
 - Commercial Fleets
 - School Bus Fleets

Program Timeline:

- Participant selection period: Apr Aug 2025
- EVSE installation: Aug Dec 2025 (expected)
- EVSE Operation and Data Collection: Jan Dec 2026











What is Vehicle-To-Everything (V2X)?

V2X enables newer electric vehicles to both charge and discharge power.

HOW V2G - VEHICLE TO GRID WORKS GRID V2G Unit ELECTRIC VEHICLE V2G Unit EV CHARGER EV CHARGER

https://www.eeworldonline.com/vehicle-to-grid-is-technically-feasible-but-whats-the-reality/

Primary V2X Use Cases:

V2H/V2B: Vehicle to Home/Vehicle to Building

 Vehicle provides back up power during a blackout situation (when the home or building is not gridconnected)

V2G: Vehicle to Grid

- Vehicle can also provide back up when the home or building is grid-connected
- Can be used to reduce load on grid during peak times

Compensation

 V2G pilots in MA have earned as much as \$3000/summer through the Connected Solutions program. (\$1,500 on average)



MassCEC V2X Demonstrations Program



Residential

- Single family and multifamily EV customers with an eligible bi-directional capable EV
- Estimated 50-100 participants
- Budget will cover installation, hardware, and software costs



Commercial

- Businesses and municipalities with eligible bi-directional capable EVs
- Estimated 2-7 participants
- Budget will cover site engineering, installation, hardware, and software costs



School Districts

- School districts with V2G compatible buses
- Estimated 2-5 school districts
- Budget will cover site engineering, installation, hardware, and software costs



Program Eligibility

Eligibility Requirements:

- > Applicants must:
 - Own or plan to purchase an EV capable of bi-directional power flow
 - Must be capable of Vehicle-to-Grid (V2G) and/or Vehicle-to-Home (V2H)
 - Vehicles that are only capable of Vehicle-to-Load are <u>not</u> eligible
 - Live in Massachusetts
- ➤ Not-for-profits and municipalities with fleets can apply under the Commercial Program
- ➤ All vehicles must be delivered by October 31, 2025
- ➤ Learn more about eligibility requirements on our Program Webpage



What will the MassCEC V2X Demonstration Project Program Do?

Identify V2X Projects

Site Selection Criteria

Application Process

Cohort Selection

Deploy V2X Projects

On-Site Assessments

Installation & Commissioning

Data Collection

Identify V2X Guidance

National Advisory
Group

Regional Stakeholder Workshops

Public-Facing Guidebook



Upcoming Dates and Resources

- ➤ Participant Application Form opens in early April
 - Selection on a rolling basis until August 2025
- ► For more information, please visit MassCEC's V2X Demonstration Program Webpage
 - Fill out the **Expression of Interest Form** now!
 - Full Application (available early April)
 - List of Eligible Vehicles
- **►** Contact Information
 - MassCECV2X@resource-innovations.com
 - Cleantransportation@masscec.com



Ride Clean Mass Charging Hubs (RCM Hubs)

APPLICATIONS OPEN

- ➤ Applications are open for the RCM Hubs programs!
- > Seeking site hosts for free DCFC charging hubs aimed at serving ride-for-hire drivers, which could include:
 - Grocery stores and/or shopping plaza
 - Gas stations and convenience stores
 - Transit stops
 - Other locations highly frequented by ride-for-hire drivers
- ➤ For more information, please visit MassCEC's RCM Hubs website and apply now!
 - Applications due mid-May
- Contact information
 - o info@rcmhubs.org
 - Cleantransportation@masscec.com





Guided Discussion



Second Assessment of the Electric Vehicle Infrastructure Coordinating Council (EVICC)

Due August 11, 2025



Second Assessment Objectives

• The Assessment will provide a clear roadmap for how Massachusetts plans to deploy the necessary EV charging infrastructure to meet the state's climate goals and other policy objectives through 2035.





Overview of Draft Assessment Outline

- 1. **Executive Summary:** Clearly conveys the state's plan to meet 2030/2035 EV charger needs and EVICC's recommendations
- 2. Purpose and Context: EVICC background; policy background; and development of Second Assessment
- 3. Current EV Charging Programs and Initiatives
- 4. EV Charger Deployment
- 5. Electric Grid Impacts and Managed Charging
- 6. Consumer Charging Experience
- 7. EV Charging Technology and Business Model Innovation



- 8. Summary/Conclusion
- 9. Appendices
 - Detailed 2030 and 2035 EV charger needs projections methodology
 - One-page summary of existing state EV-related programs by program type (e.g., make-ready, vehicle, and charger incentive programs)
 - Charging fee principles, inclusive of common fee structures and level of fees, and other educational materials for EV charging customers and EV charger site hosts
 - EJ Community Siting Guide
 - Summary status of recommendations from First Assessment
 - Information on non-infrastructure EV programs and initiatives (e.g., MOR-EV, Accelerating Clean Transportation (ACT) School Bus, state employee domicile EV policy, etc.)



General Discussion Questions

• Is this section missing any key topics?

• What items within each topic should we make sure are discussed / analyzed (i.e., what should our focus be within each topic)?

• What recommendations should we be exploring related to this topic?



Consumer Charging Experience Section

- User experience objectives
- Overview of key customer experience considerations and why they matter, including the current (real and perceived) state of each consideration
- Summary of current and proposed charger reliability, registration, data sharing, and operational standards
 - Overview of best practices
 - Summary of current state and federal legislative and regulatory requirements
 - State program requirements
 - Other states
- Background on EVICC technical committee
- Summary of existing consumer resources
 - Charger apps and website resources for customers
- Recommendations



Consumer Charging Experience Section (cont.)

• Discussion Questions:

- Are these the right "user experience objectives"?
 - **Drivers:** A seamless and intuitive charging process enhances satisfaction and encourages EV adoption. Complicated interfaces or unreliable services can deter potential users.
 - **Station Owners:** Positive user experiences attract repeat customers and build brand loyalty, potentially increasing revenue.
 - Policy Makers: Ensuring accessible and user-friendly charging supports adoption goals by promoting EV usage.
- Are these the right "key consumer experience considerations"? Is there anything that we should add?
 - Reliability
 - Data sharing
 - Charger registration
 - Consumer disclosure and payment
 - Operational standards
 - Other consumer protections
 - ADA compliance
 - Parking spacing
 - Charge fee types
 - Signage



Consumer Charging Experience Section (cont.)

Discussion Questions:

- Are we missing any charger apps or website resources that should be highlighted to customers?
 - Charging Network Apps (e.g., PlugShare, ChargePoint): Provide real-time information on charger locations, availability, and user reviews
 - Navigation System Integration (e.g., Tesla, Google Maps): Enables seamless route planning with charging stops
 - Subscription Services (e.g., Electrify America Pass): Offer discounted rates and exclusive access to networks
 - Customer Support Lines: Provide assistance for technical issues or billing questions
 - Educational Materials (e.g., how-to guides, tutorials): Help new EV drivers understand charging processes and options
 - Government Resources and Incentives Information
 - EV pages on MassCEC's Clean Energy Lives Here website and call center
 - EV Charging Station Owner-Operator Resources developed by EVICC Technical Committee
- Are there any recommendations that we should explicitly be exploring?
 - For example: working with Google and others to ensure that EV charging data is available on common map apps
 - For example: develop guidance for site owners on the types of chargers best suited for different applications
- Anything else that should be included in this section?



EV Charging Technology and Business Model Innovation

- Overview of current charging business models
 - Summary of model types
 - Benefits and barriers of current models
- Overview of novel business models
 - Examples of novel models and the challenges they address
 - Benefits and barriers of new models
- Overview of emerging EV charging technologies
- Concerns and potential solutions for EV charging business models
- Recommendations



EV Charging Technology and Business Model Innovation (cont.)

Discussion Questions:

- Are these the right categories of "current charging business models"?
 - Host-Owned
 - Public Ownership
 - Utility-Owned
 - Charge Point Operator (CPO)
 - Franchising, Advertising & Sponsorship
 - Charging as a Service (CaaS)
- Are these the right categories of "novel business models"? Any that we should add?
 - Turnkey Solutions
 - Dynamic Pricing Strategies
 - Mobile Charging Services
 - Energy-as-a-Service



EV Charging Technology and Business Model Innovation (cont.)

Discussion Questions:

- Are these the right categories of "emerging EV charging technologies"?
 - Battery innovations
 - Charging technology advances
 - Customer experience enhancements
 - Smart charging solutions
 - Storage integration
 - Renewable energy integration
- Are these the right categories of "concerns and potential solutions"? Any that we should add, subtract, or combine?
 - Infrastructure Costs
 - Energy Pricing
 - Utilization Rates
 - Revenue Streams
 - Consumer Convenience
 - Interoperability
 - Grid Dependency
 - Government Incentives
 - Technology Evolution
 - Battery Advancements
 - Sustainability
 - Cybersecurity
 - Supply Chains



EV Charging Technology and Business Model Innovation (cont.)

Discussion Questions:

- Are these the right categories of "recommendations"?
 - Partnerships
 - Pricing
 - Data management
 - Siting
 - Standards and policy alignment
 - Financing
- Are there any recommendations that we should explicitly be exploring within the above categories?
- Anything else that should be included in this section?



Overall Discussion Questions

Are there any key sections that the EVICC Assessment outline is missing?

What general recommendations should we be exploring?

• Any additional resources, information, etc. that should be included in the Assessment to fulfill EVICC's statutory obligations and/or to better serve the public?



Updated Second Assessment Work Schedule

- February 2025: <u>Detail Assessment outline</u> released
- March & April 2025: Public Hearings
- May 2025:
 - Assessment analysis completed
 - Agencies complete assigned sections
- June-July 2025:
 - EVICC members review draft Assessment
 - Draft Assessment released for public comment
- August 11, 2025: Second EVICC Assessment completed
- August 2025: Public webinar on Second Assessment





Presentations

Overview

Goal of Analysis: To analyze the potential for managed charging solutions to minimize the impacts of electric vehicles (EVs) on the electric system and quantify possible load reductions.

• We are using a broad definition of managed charging that includes strategies such as time-of-use (TOU) rates, off-peak charging rebates, utility/third party-controlled active management, etc.

Key Questions: What is the value of managed charging? How does it compare across geographies?

We assess and discuss the potential for managed charging in 2030 at five <u>different key geographies</u>:

- Urban centers
- Suburban areas
- Rural communities
- Major highways/transportation corridors
- Fleet depots (trucks and buses)

Approach:

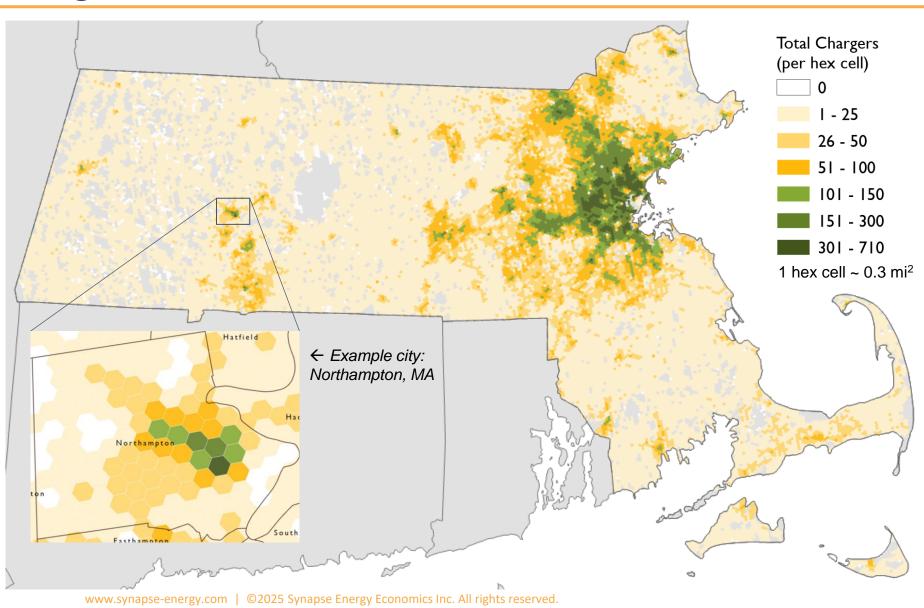
- Identified key geographies
- 2. Designed study scenarios
- Determined daily load and grid impact in 2030 in each key geography (on summer peak days)
- 4. Assessed load management potential at each key geography

Projected Total Chargers in 2030

Forecasted EV chargers needed in Massachusetts by 2030 to support the Commonwealth's goal of having 980,000 EVs on the road

| Charger Type | 2030 Count |
|--------------|------------|
| Home L1 | 164,734 |
| Home L2 | 417,361 |
| Workplace L2 | 32,567 |
| Public L2 | 35,000 |
| Public L3 | 7,000 |
| Total | 656,662 |

2030 Charger Counts from first EVICC Assessment



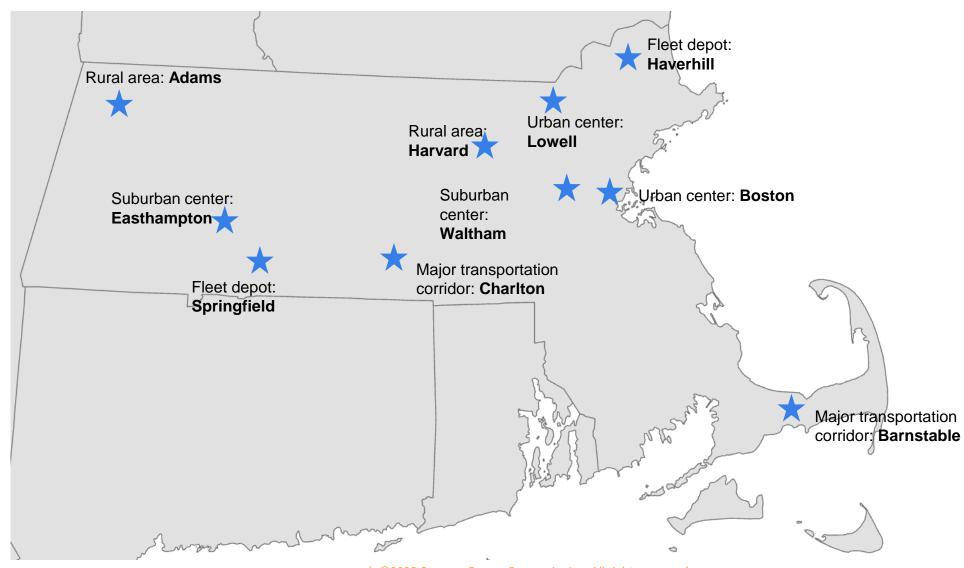
Key Geography Selection

• Solutions and issues will be different in different areas and use cases. By analyzing EV charging at five key geographies (with two example locations for each geography), we seek to develop a broad understanding of the potential, direct impact of managed charging on the electricity system



- We selected key geographies that are geographically varied, and are diverse in the number and types of chargers:
 - Suburban and rural areas typically have higher levels of residential charging, while urban areas have more workplace and public chargers (L2 and L3)
 - Selected geographies across the state, including Western Massachusetts, greater Boston area, the Cape, Northeastern Massachusetts, etc.

Key Geography Selection



Summary of Key Geographies – 2030 Charger Counts

Figure 1. Chargers in Rural, Suburban, and Urban Areas

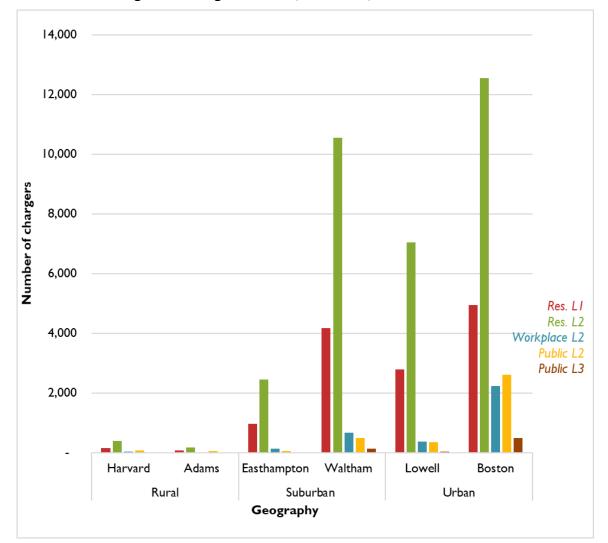
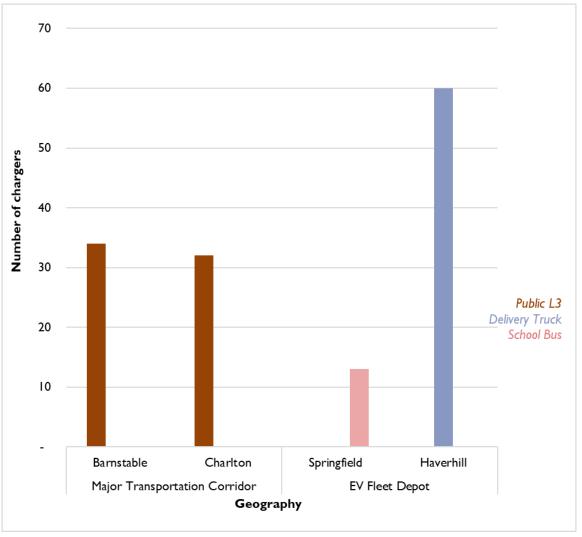


Figure 2. Chargers at Major Transportation Corridors and in EV Fleet Depots



Scenario Design and Inputs

To estimate the potential for managed charging, we examine load from EV chargers in three scenarios:

Scenario 1: Unmanaged

- Assume all EV chargers are unmanaged
- Load curves for chargers serving light-duty vehicles from the Department of Energy Alternative Fuels Data Center's EVI-Pro Lite Tool¹
- Load curves for fleet depot charging from Lawrence Berkely National Laboratory's Medium- and Heavy-Duty Electric Vehicle Infrastructure Load Operations and Deployment (HEVI-LOAD) Model²

Scenario 2: Status Quo (currently offered passive load management programs)

- All light-duty EV load is managed according to currently offered TOU rates at present enrollment levels (15% of all light-duty EVs), with current programs seeking to shift ~80% of charging off-peak³
- Assume fleet vehicles participate on ConnectedSolutions and Fleet Off-Peak Charging Program (managed)

Scenario 3: Advanced Managed Charging

- This scenario provides insight into the remaining load reductions beyond the currently approved programs
- 1. Department of Energy's Alternative Fuels Data Center. Electric Vehicle Infrastructure Toolbox: EVI-Pro Lite: Load Profile Tool. Available at: https://afdc.energy.gov/evi-x-toolbox#/evi-pro-loads
- 2. Wang, B., Zhang, C. 2021. Medium- & Heavy-Duty Electric Vehicle Infrastructure Load, Operations and Deployment Tool (HEVI-LOAD). Available at: https://www.energy.ca.gov/sites/default/files/2021-09/5%20LBNL-FTD-EAD-HEVI-LOAD%20Medium-%20and%20Heavy-Duty%20Load%20Shapes_ADA.pdf
- 3. W Massachusetts Prage III P2025 r Syram of Early Evaluation Repultination af 10910, DPU 24-64 Exhibit NG-MMJG-1

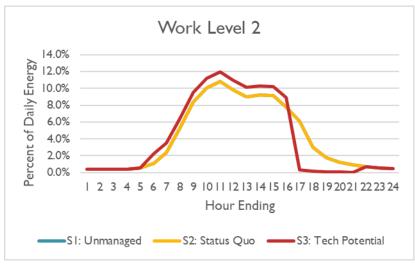
Scenario 3 Assumptions: Advanced Managed Charging

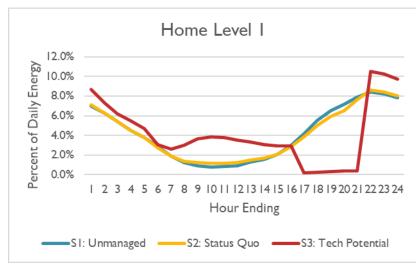
Scenario 3 serves as a hypothetical scenario to answer the question "if we could find a way to almost entirely manage charging in the future, what would its value be to the electric system?"

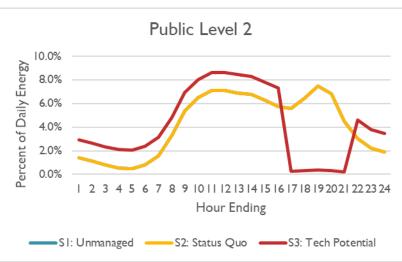
- Home L1 & L2 chargers:
 - Active management (optimizing for distribution and/or bulk power system, depending on constraint and need)
 - 95% participation, 100% off-peak charging
- Workplace chargers:
 - Active management (optimizing for distribution and/or bulk power system, depending on constraint and need)
 - 95% participation, 100% off-peak charging
- Public chargers:
 - L2: 95% participation, 100% off-peak charging
 - L3: 10% load reduction during on-peak periods for all chargers
 - this would slow charging speeds somewhat, but would only increase L3 charging time by a few minutes, ensuring a positive customer experience
- School bus and delivery truck fleets: no additional management relative to Scenario 2

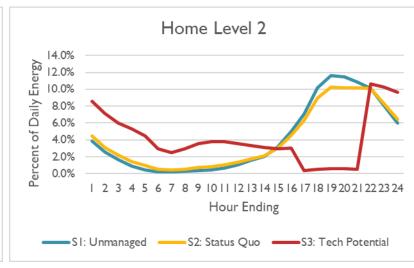
Average Load Curves – Chargers for Light-Duty Vehicles (LDVs)

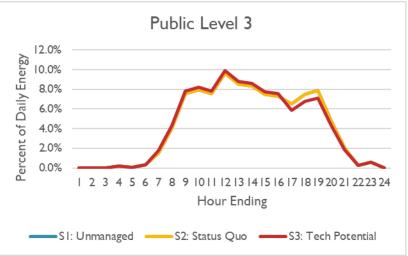
- Charger-specific load curve is applied to every charger of that category
- Zero percent indicates that no chargers are charging at that time
- For workplace and public chargers, the unmanaged and status quo have the same curves (blue unmanaged curve is thus not visible on the graphs)





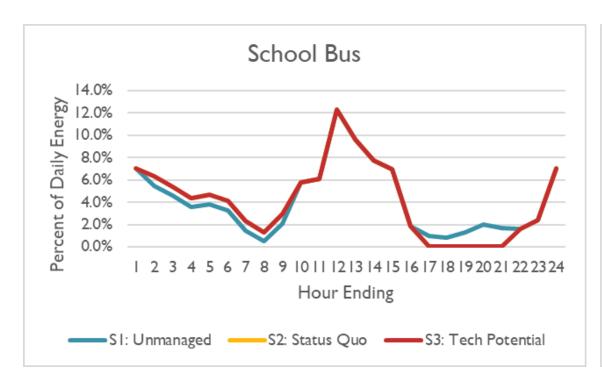


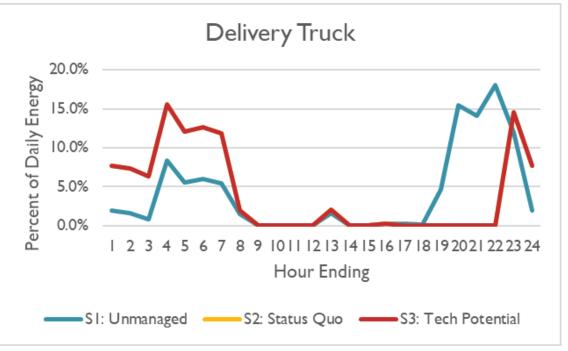




Average Load Curves – Chargers for Fleet Depots

- Source: LBNL HEVI-Pro¹
- Discussions with partners indicate that all charging is primarily off-peak to take advantage of current program offerings





^{1.} Wang, B., Zhang, C. 2021. Medium- & Heavy-Duty Electric Vehicle Infrastructure Load, Operations and Deployment Tool (HEVI-LOAD). Available at: https://www.energy.ca.gov/sites/default/files/2021-09/5%20LBNL-FTD-EAD-HEVI-LOAD%20Medium-%20and%20Heavy-Duty%20Load%20Shapes_ADA.pdf

Headroom on the Distribution System

- Headroom on the distribution system refers to the difference between the maximum electricity demand on the electric grid and the available capacity to supply that demand
 - We assess headroom on the substation and the circuit (depending on what is relevant for each key geography)
- Headroom calculation
 - Nominal summer rating (capacity, in MVA)¹ minus the 2022 peak load (MW)
 - Forecasts of peak load to 2030 were not available
 - Substation and feeder capacities and load provided by Eversource and National Grid
- We consider the substation or circuit to be "overloaded" if demand reaches or exceeds 80% of its nameplate capacity^{2,3}

- 1. 1 MVA is equal to 1 MW
- 2. EPRI. 2023. EVs2Scale2030 Grid Primer: An Initial Look at the Impacts of Electric Vehicle Deployment on the Nation's Grid. Available at: https://www.epri.com/research/products/000000003002028010.
- 3. We assume that no feeders assessed in this analysis are used as backup feeders for other feeders.

Coincident Peak Demands & Program Design

- Managed charging can avoid bulk system costs: transmission costs and capacity costs
 - Transmission and capacity costs are driven by annual system-wide demand
 - System-wide peak periods typically occur on hot summer afternoons in New England
 - Managed charging targeting bulk power system cost can be focused on these peak times
 - Program design can be tailored to these predictable, regularly occurring periods (e.g., TOU rates or scheduled demand response events)
- Peak periods on the distribution system may not always be coincident with system-level peaks
 - Distribution constraints can occur at different locations and at different times; no one feeder and substation is the same
 - Managed charging programs can target distribution constraints through actively controlled charging (e.g., utility or third-party controlled)
 - This generates more complex data requirements, controls, and the need for a distributed energy resource management system (DERMS) platform
 - It may be possible to co-optimize for both system-level peaks and distribution-level constraints, depending on the specifics of that location/constraint
- Bulk power system and distribution avoided costs are not additive; it is not a given that managed charging will be able to target and achieve reductions for both components of the electric system

State-Wide Potential for Managed Charging for Light-Duty Vehicles

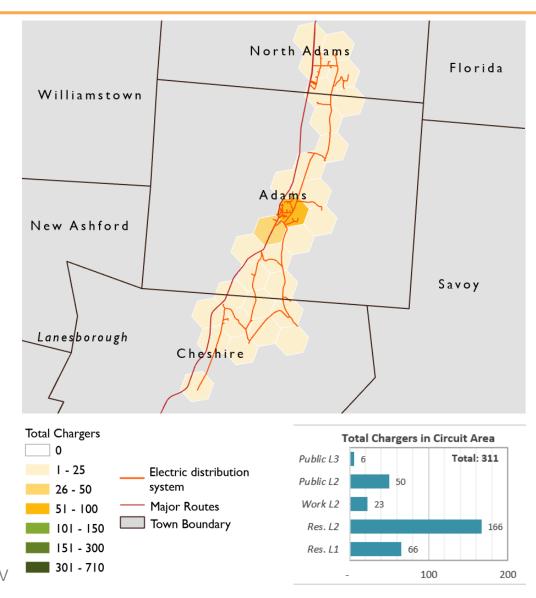
- In 2030, there will be over 656,000 chargers serving the 980,000 light-duty EVs on the state's roads
- The total unmanaged chargers will add 1.4 GW to the electricity system
 - This represents 12% of the state's annual peak demand in 2030 and 5% of ISO-NE's system demand in 2030
- The EV management potential from the currently offered programs (e.g., TOU rates and passive management) could reduce that demand by ~100 MW, to **1.3 GW**
- Managed charging beyond the status quo could reduce on-peak demand by 1.1 GW, reducing peak demand from EVs to 200 MW
 - 200 MW represents only 1.7% of the state's annual peak demand and less than 1% of the ISO-NE's total demand in 2030
- The impact on the distribution grid will be varied and location-dependent:
 - Some areas have lower EV loads and substantial headroom (e.g., rural areas), while other areas have large levels of expected EV adoption and already shrinking available headroom on distribution equipment serving that load (e.g., urban and suburban areas)

Rural Areas - Adams

The Town of Adams is made up of dispersed residences and several businesses and is served by National Grid. The circuit serving Adams center (non-gray hex cells) was selected for analysis; it is anticipated to serve 311 chargers by 2030.

- The 311 unmanaged chargers in the pictured Adams circuit area would take up 10% of available headroom on the circuit; the circuit is not overloaded due to EV load in any scenario¹
- Managed charging beyond the status quo could reduce on-peak demand by 0.7 MW
 - Greatest reduction potential from residential and public L2 chargers

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 8.9 | | |
| EV Demand - Unmanaged | | 0.9 | 10% |
| EV Demand – Status Quo | | 0.8 | 9% |
| EV Demand – Advanced Mgmt | | 0.2 | 2% |



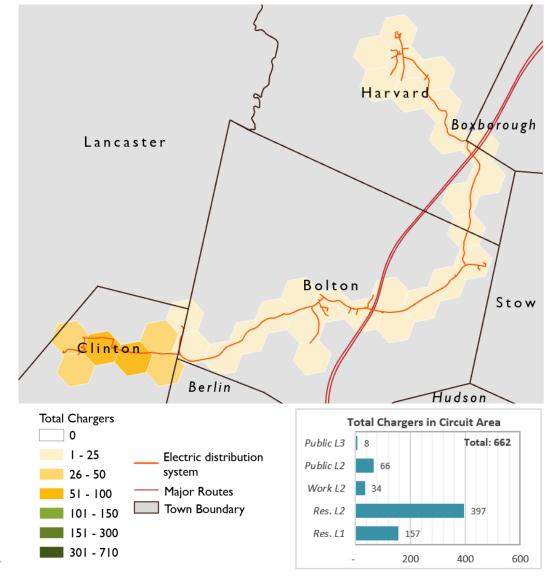
^{1.} Analysis does not include the load growth impact of building electrification and other non-EV load synapse-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.

Rural Areas - Harvard

The Town of Harvard contains dispersed residences, several businesses, a small downtown corridor and is served by National Grid. The circuit serving Havard center (non-gray hex cells) was selected for analysis; it is anticipated to serve 662 chargers by 2030.

- The 622 unmanaged chargers in the pictured Harvard circuit area would take up 31% of available headroom on the circuit; the circuit is not overloaded due to EV load in any scenario¹
- Managed charging beyond the status quo could reduce on-peak demand by 1.2 MW
 - Greatest reduction potential from residential and public L2 chargers

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 5.0 | | |
| EV Demand - Unmanaged | | 1.6 | 31% |
| EV Demand – Status Quo | | 1.4 | 29% |
| EV Demand – Advanced Mgmt | | 0.2 | 5% |



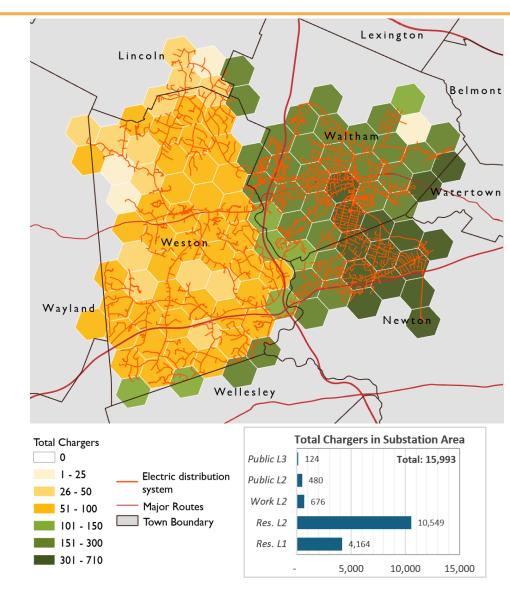
Suburban Areas - Waltham

Waltham contains dense residential neighborhoods, downtown main streets, and mixed commercial and business use areas. Waltham center is served by one substation in Eversource's service territory.

The substation serving Waltham is forecast to serve a total of 15,993 chargers by 2030.

- If unmanaged, the 15,993 chargers in Waltham's substation area would take up **132%** of available headroom, **overloading the substation**¹
- Managed charging beyond the status quo could reduce on-peak demand by 24.5 MW; in this case, EV load would only take up 17% of available headroom
 - Greatest reduction potential from residential L2 chargers

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Substation Headroom 2022 | 23.8 | | |
| EV Demand - Unmanaged | | 31.4 | 132% |
| EV Demand – Status Quo | | 28.5 | 120% |
| EV Demand – Advanced Mgmt | | 4.0 | 17% |



^{1.} Analysis does not include the load growth impact of building electrification and other non-EV www.agynapse-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.

Suburban Areas - Easthampton

Easthampton contains medium-density residential neighborhoods, a medium-sized downtown main street, and several mixed commercial and business use areas. Easthampton center is served by a single substation in Eversource's service territory.

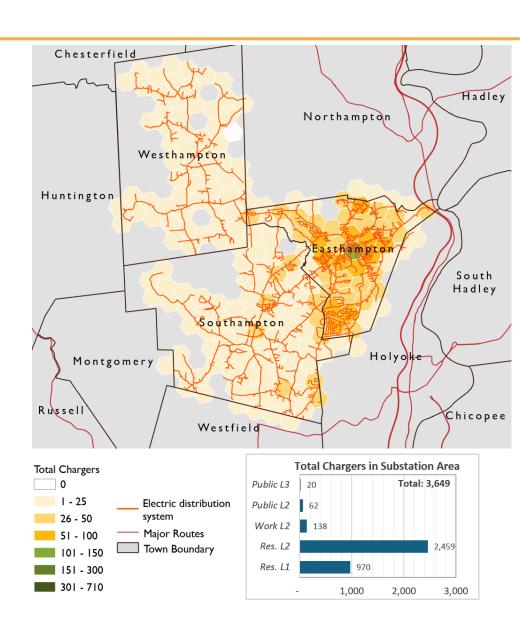
The substation serving Easthampton is forecast to serve a total of 3,649 chargers by 2030.

- If *unmanaged*, the 3,649 chargers in Easthampton's substation area would take up **17%** of available headroom; the substation is not overloaded in any scenario¹
- Managed charging beyond the status quo could reduce on-peak demand by
 5.4 MW
 - Greatest reduction potential from residential L2 chargers

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Substation Headroom 2022 | 39.6 | | |
| EV Demand - Unmanaged | | 6.8 | 17% |
| EV Demand – Status Quo | | 6.1 | 15% |
| EV Demand – Advanced Mgmt | | 0.7 | 2% |

EV Demand – Advanced Mgmt

1. Analysis does not include the load growth impact of building electrification and other non-www.sloade-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.



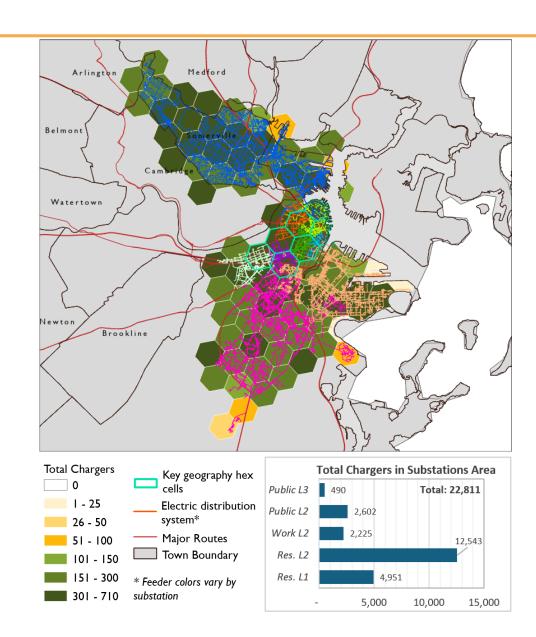
Urban Areas - Boston

Boston center (1.85 mi² and 3,542 chargers) contains the highest density of chargers in Massachusetts. Boston chargers serve mixed-use urban core areas, apartment/condo buildings, and large workplaces. Boston center is served by Eversource and contains 9 substations, which also serve Somerville and parts of Cambridge.

Substations covering Boston center are forecasted to serve a total of 22,811 chargers by 2030. A portion of the downtown area (selected cells) is projected to have 3,542 chargers (with many workplace and public chargers).

- The total *unmanaged* EV load in all substation areas within Boston represents **0.5**% of ISO-NE's 2030 summer net demand for the state
- In the selected cells, managed charging beyond the status quo could reduce on-peak demand by 8.5 MW. Managed charging in all substation areas within Boston could reduce on-peak demand by 43.2 MW
 - Greatest reduction potential from residential, workplace and public L2 chargers

Boston has a networked distribution system; headroom calculations will require further discussion and input from Eversource.



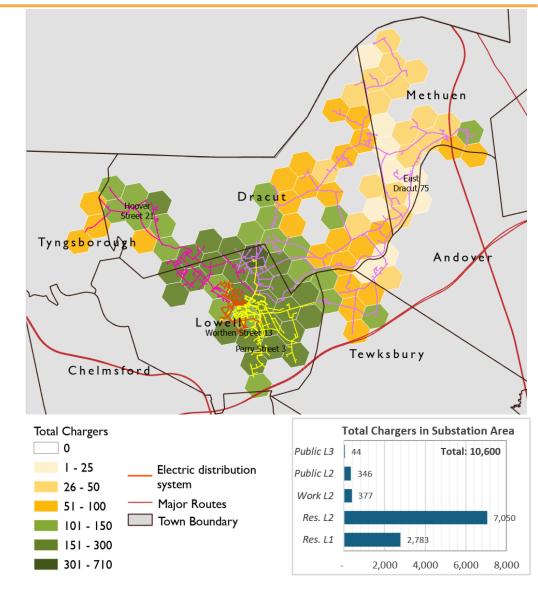
Urban Areas – Lowell

Lowell contains dense residential neighborhoods, downtown main streets, and mixed commercial, industrial, and business use areas. Lowell center is served by four different substations in National Grid's service territory.

Substations serving Lowell are forecasted to serve a total of 10,600 chargers by 2030.

- If *unmanaged*, the 10,600 chargers in the Lowell substation areas would take up **19%** of available headroom. The substations are not overloaded in any scenario¹
- Managed charging beyond the status quo could reduce on-peak demand by 16.3 MW
 - Greatest reduction potential from residential L2 chargers

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Substation Headroom 2022 | 103.8 | | |
| EV Demand - Unmanaged | | 20.1 | 19% |
| EV Demand – Status Quo | | 18.2 | 18% |
| EV Demand – Advanced Mgmt | | 1.9 | 2% |



^{1.} Analysis does not include the load growth impact of building electrification and other non
*Edwls@aspecenergy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.

Transportation Routes – Charlton Rest Plaza

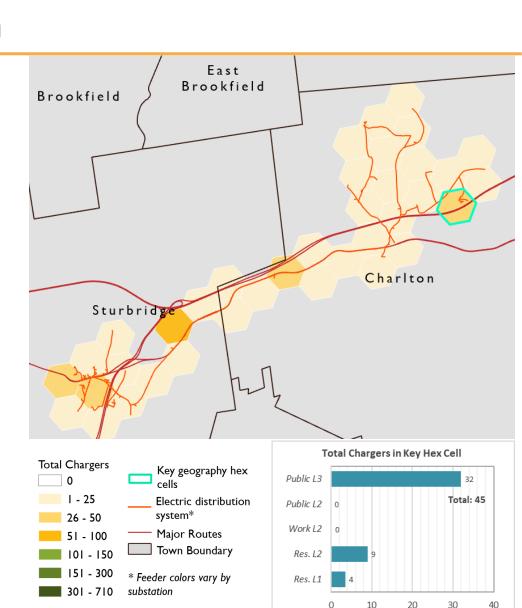
Charlton Rest Plaza is a rest stop along I-90, near the I-84 interchange. It is in the 99th percentile for DC fast chargers within ½ mile of a highway in a single hex cell. The plaza is in National Grid's service territory.

The 45 chargers (selected hex) at the Charlton Rest Plaza include 32 L3 chargers.

- These chargers could take up 27% of available headroom on the circuit. All unmanaged chargers in the circuit area could take up 86% of available headroom on the circuit, overloading the circuit¹
- Managed charging beyond the status quo is limited; we estimate management solutions could reduce on-peak demand by 0.1 MW

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 2.9 | | |
| EV Demand - Unmanaged | | 0.8 | 27% |
| EV Demand – Status Quo | | 0.8 | 26% |
| EV Demand – Advanced Mgmt | | 0.7 | 23% |

^{1.} Analysis does not include the load growth impact of building electrification and other nonvEW. 9achse-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.



Transportation Routes – Barnstable

Barnstable Exit 68 is an off-highway exit on I-495. It is in the 99th percentile for DC fast chargers within ½ mile of a highway in a single hex cell. Barnstable is in Eversource's service territory.

The impact for Barnstable is highly seasonal-specific; winter traffic is substantially lower. By 2030, New England's electricity grid is still expected to be a summer-peaking system

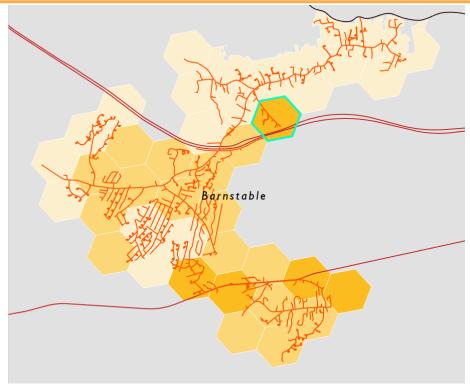
The 64 chargers (selected hex) at Exit 68 include 34 L3 chargers.

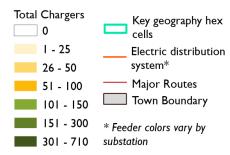
- These chargers could take up 4% of available headroom on the circuit; all unmanaged chargers in the circuit area could take up 13% of available headroom on the circuit; the circuit is not overloaded in any scenario¹
- Managed charging beyond the status quo is limited; we estimate management solutions could reduce on-peak demand by 0.2 MW

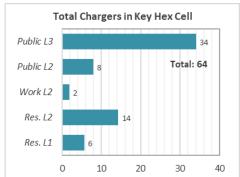
| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 22.6 | | |
| EV Demand - Unmanaged | | 0.9 | 4% |
| EV Demand – Status Quo | | 0.9 | 4% |
| EV Demand – Advanced Mgmt | | 0.7 | 3% |

EV Demand – Advanced Mgmt

1. Analysis does not include the load growth impact of building electrification and other non
WW QAC pse-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.







EV Fleet Depots - Springfield - School Buses

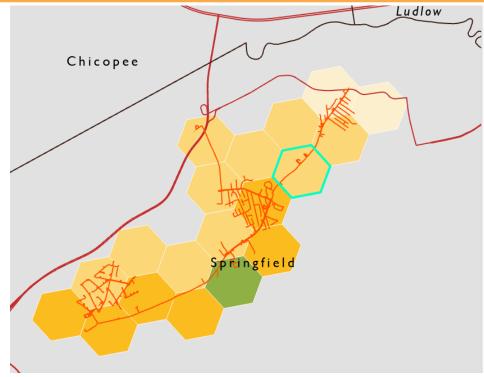
Springfield is the 3rd largest city in Massachusetts. First Student, Inc., a public bus company, maintains two school bus depots. Recently, Springfield won a grant to electrify 25 of its 125 diesel school buses (20% of its fleet).¹ If half of these school buses are housed at the selected depot, First Student Inc. would add 13 Level 2, 25-kW chargers by 2030. The circuit serving the First Bus Depot is forecast to serve a total of 839 chargers by 2030.

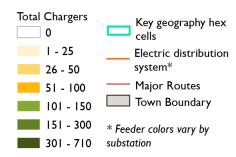
- The 13 bus chargers plus 19 other chargers (selected hex) could take up 1% of available headroom on the circuit; the 839 chargers in the circuit area could take up 40% of available circuit headroom; the circuit is not overloaded in any scenario²
- Managed charging beyond the status quo is not likely to reduce charging from school buses any further

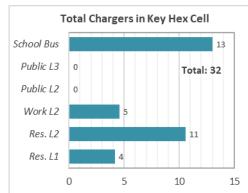
| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|-----------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 5.6 | | |
| EV Demand – Unmanaged (hex) | | 0.08 | 1% |
| EV Demand – Status Quo | | 0.04 | 1% |
| EV Demand – Advanced Mgmt | | 0.002 | 0% |

^{1.} Deforge, Jeanette. "Springfield school buses going electric with federal EPA grant." (Jan 28 2025). Available at https://www.masslive.com/westernmass/2025/01/springfield-school-buses-going-electric-with-federal-epa-grant.html









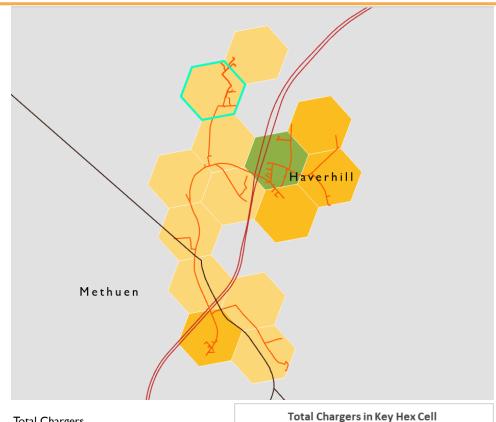
EV Fleet Depots – Haverhill – Distribution Warehouse

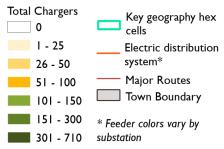
Haverhill contains a distribution warehouse that has recently added 80 delivery trucks. Assuming the warehouse installs three EV chargers of 25 kW for every four trucks, this site contains 60 25-kW chargers. This warehouse is in National Grid's service territory. The circuit serving the warehouse is forecast to serve a total of 620 chargers by 2030.

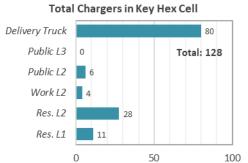
- The 60 delivery truck chargers plus 48 other chargers (selected hex) could take up 63% of available headroom on the circuit. The *unmanaged* 620 chargers in the circuit area could take up 118% of available circuit headroom, overloading the circuit²
- The status quo scenario (currently offered programs) could avoid 1.7 MW on the entire circuit, reducing the EV-related circuit loading to 71%
- Managed charging beyond the status quo is not likely to reduce charging from delivery trucks any further

| Category | Capacity (MW) | EV Demand (MW) | % of headroom |
|---------------------------|------------------|-------------------|------------------|
| Circuit Headroom 2022 | 2.2 | | |
| EV Demand – Unmanaged | | 1.39 | 63% |
| EV Demand – Status Quo | | 0.10 | 4% |
| EV Demand – Advanced Mgmt | | 0.005 | 0% |

- Como, T. Haverhill's Amazon Rolls Out 80 Electric Delivery Vans; Plans 100,000 Networkwide by 2030 (Oct 2023). Available at https://whav.net/2023/10/27/haverhills-amazon-rolls-out-80-electric-delivery-vans-plans-allelectric-fleet-by-2030/
- 2. Analysis does not include the load growth impact of building electrification and other non-EV load. www.synapse-energy.com | ©2025 Synapse Energy Economics Inc. All rights reserved.







Key Findings

Managed charging has the potential to reduce peak demand and avoid and defer electricity system costs, on both the bulk power system (capacity and transmission) as well as the distribution grid in Massachusetts

• In 2030, managed charging beyond what the utilities are currently offering could reduce on-peak demand by over 1 GW

The impact on the distribution grid is highly location dependent

- Typically, rural areas have lower load (both electric vehicles (EVs) and non-EV load), as well as more available capacity on the distribution system; here, managed charging is likely more impactful at avoiding bulk power system costs
- In suburban and urban areas, load is greater and there is less capacity for more load on the grid; managed charging in these areas is likely going to help avoid expensive upgrades to substations and feeders across the system
 - Electrification will appear in pockets, based on land-use patterns and socioeconomic factors; managed charging in areas of high EV adoption and already high loads will be especially beneficial
- Loads from large truck/bus fleets and from large banks of L3 chargers (fast-chargers) can be very high; the impact on the distribution grid is highly location-dependent.
 - Managed charging for L3 chargers is especially challenging

In the future, as more EVs are adopted across the state, developing effective managed charging programs and value streams will be paramount to avoid costly upgrades across the electricity system

Thank you!

Sarah Shenstone-Harris

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Questions?



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Presentations

- Presenters should keep to the assigned time
- The EVICC Chair will allow questions from EVICC members first and then the public if time remains

Public Comments

- Use the "raise hand" function to indicate your desire to speak at the appropriate time
- Identify yourself and affiliation prior to commenting
- Limit comments and questions to 3 minutes
- Please engage in constructive and respectful dialogue
- Be able to substantiate assertions or claims in support of comments



Public Comment