

Massachusetts Electric Vehicle Infrastructure Coordinating Council

Meeting 4: transmission, distribution, and financing

Thursday, June 29, 2023 | 1–3:30 p.m.

via Zoom

EVICC members

- Undersecretary Michael Judge, Executive Office of Energy and Environmental Affairs, EVICC Chairperson
- Undersecretary Monica Tibbets-Nutt, Department of Transportation
- Undersecretary Layla D'Emilia, Executive Office of Housing and Economic Development
- Commissioner Staci Rubin, Department of Public Utilities
- Aurora Edington, Department of Energy Resources
- Brian Ferrarese, Department of Environmental Protection

EVICC member designees

- Cobi Frongillo for State Representative Jeff Roy, Chair, Joint Committee on Telecommunications, Energy, and Utilities
- Audrey Horst for Sen. Mike Barrett, Chair, Joint Committee on Telecommunications, Energy, and Utilities

Additional attendees and presenters

- Colette Lamontagne, Director of Internal Innovation, National Grid
- Julia Gold, Principal Strategy and Policy Analyst, Clean Transportation, National Grid
- Gideon Katsh, Principal Analyst in Clean Energy Development, National Grid
- Dave Mullaney, Principal, Carbon-Free Transportation, Rocky Mountain Institute
- Jennifer Kritzler, Deputy Director, Northeast Region, CALSTART
- Rhys Webb, Clean Transportation Program Manager, MassCEC
- Chip Silverman, Lead for Vehicle Integration Policy and Market Development, FreeWire
- Daniel Gatti, Director of Clean Transportation Policy, Executive Office of Energy and Environmental Affairs
- Jennifer Haugh, Vice President of Planning and Customer Engagement, GreenerU
- Daniela Miranda, Project Coordinator, GreenerU

Meeting resources

- [EVICC website](#)
- [EVICC contact information](#)
- [EVICC data needs](#)
- [Summary of state and federal EV charging station programs](#)

Meeting goals

- Approve meeting minutes from June 1 and June 22 meetings
- Provide information on transmission, distribution, and financing of EV charging stations
- Ask for input on an outline for the EVICC final assessment deliverable to the Legislature
- Provide time for public discussion / comment

Meeting agenda

1. Call to order:
 1. Judge called the meeting to order at 1:03 p.m.
2. Review and approve updated meeting minutes of June 1, 2023 and June 22, 2023

1. Rubin moved to approve the updated minutes for both meetings. Edington seconded. The motion carried unanimously.
3. Review outline of initial assessment and assignments
 1. EEA will coordinate section writers, in particular for Section 5.
 2. GreenerU will send out a communication by Friday, June 30, regarding assignments and writing style.
 3. Horst offered to provide assistance in writing and editing from a technical standpoint.
 4. After a first draft is sent out, everyone should provide EEA with suggested edits and we will try to compile those edits in advance of that meeting.
 5. Please be mindful if and when there are five or more agencies working on a section together so we ensure we follow public meeting laws.
 6. All agencies are asked to submit their portions to jennifer.h@greeneru.com no later than July 25, 2023. (Earlier would be even better.)
4. Presentations
 1. Aurora Edington, DOER, GMAC updates
 1. Edington provided a refresher on the Grid Modernization Advisory Council, which is an 18-person council meeting monthly since March. The group reviews and provides recommendations on electric distribution companies (EDCs) or electric-sector modernization plans (ESMPs). The focus is on finding least-cost investments in the distribution system, alternatives that will help achieve GHG emissions limits, and transparency and stakeholder engagement in the grid planning process. Slide 2 offers more details about what electric distribution company ESMPs must do.
 2. Slide 3 offers a timeline on the tasks of the GMAC as directed by the 2022 climate law stretching into 2028.
 3. Slide 4 provides a short-term timeline through January 2024, which aligns with the efforts of EVICC. GMAC is accepting public comment during the July 13 and August 10 meetings. Message MA-GMAC@mass.gov to provide comments.
 4. Slide 5 covers sections pertaining to EVICC:
 1. 4.2.3 electrification growth, which includes transportation
 2. 5.2.6 electric vehicles, which is a 5 and 10-year electric demand forecast
 5. Slide 6 covers additional sections:
 1. 8.2 Transport: electric vehicle assumptions and forecasts with a number of subsections
 2. Section 9.1.2 Transport: electric vehicle charging demand management scenarios and associated preliminary incentive designs
 6. Edington encouraged everyone to submit comments and questions with GMAC, as the group is actively working toward understanding electric load needs.
 7. Rubin asked that since the DPU is creating a Phase 1 report for August, do we envision that the report includes the next steps for additional phases? There are a lot of iterative pieces here. Judge said that EVICC is supposed to meet on an ongoing basis, with an assessment due every two years, and we have \$50 million to spend with only a couple of smaller-ticket items identified. Once the GMAC plans are published, how can EVICC advance some of those and supplement some of the analysis? There will likely be things we can't fully answer and will identify as needing further analysis. We'll likely meet on a less frequent basis. Perhaps we can add this to the report—some discussion of next steps for EVICC.
 8. Edington mentioned that something DOER has posted publicly is a list of recommendations for the ESMPs. They are interested in ongoing working groups in different sectors so there is continued stakeholder engagement. One of those groups should certainly be transportation.
 9. Judge noted that there is a public comment section toward the end of the meeting, so there will be an opportunity to weigh in later.

2. Jennifer Kritzler, CALSTART, Rhys Webb, MassCEC, and Heather Takle, PowerOptions
 1. Webb introduced herself and MassCEC.
 1. This presentation is on the Mass Fleet Advisor program and facility upgrade challenges. This is a free technical assistance program for private medium- and heavy-duty fleets. MassCEC wanted to make sure that the private fleets are also being addressed, so they will be expanding this program and continuing to run it.
 2. Kritzler introduced herself and CALSTART, which is the lead consultant to MassCEC on this program.
 3. Takle introduced herself and PowerOptions.
 4. Webb presented:
 1. Slide 2 shows the program background on Mass Fleet Advisor. The intention is to bring visibility and prepare fleets to take advantage of MOR-EV trucks funding. She reviewed the eligibility requirements for this program and the three phases: fleet report, electrification analysis, and procurement.
 5. Takle presented:
 1. Slide 3 discusses the virtual site assessment offerings. They essentially created a virtual site walk to offer high-level recommendations tailored to fleet size and duty cycle. Ultimately, the output of Phase 1 is used at a high level to create an assessment to entice fleet owners to understand their infrastructure. Phase 2 will go deeper with fleet owners receiving on-site assessments and an electrical assessor doing an on-site site walk. There's also a deeper level of technical assessment with a managed charging analysis and greater specificity. This also includes a utility-side infrastructure cost evaluation by utility divided by low, medium, and high cost screening.
 2. Slide 4: EVSE installation costs—the slide shows a table of institution/company types, fleet size, recommendations, chargers, installation costs, and estimated cost per vehicle. A takeaway is that the small fleets could be laggards, as the cost per vehicle is comparatively higher. What the table does not show are the site-specific conditions and other factors that contribute to cost estimates.
 3. Slide 5: case study of a dry cleaning company. The company is very enthusiastic about sustainability; their fleet and site were on the low end of upgrades required without too much by way of costs.
 4. Slide 6: case study of a lumber company. This was a greater challenge with long-haul driving and heavy equipment, requiring significant upgrades to current infrastructure and routes requiring higher levels of equipment.
 6. Kritzler went over slide 7:
 1. Key obstacles—every fleet requires a significant load for full fleet electrification. Most fleets require new electrical panels or utility service lines, and thus these sites will require utility upgrades for those sites. There is an unclear path to utility-side information and analysis, and some fleets are operating out of older or leased facilities. There are high costs of utility and site electrical upgrades, which can often come as a surprise to fleet owners.
 2. Risks of inaction—there could be significant fleet electrification delays due to high costs, construction timeline, supply chain timeline, etc. These delays can impact business needs and may deter fleets from pursuing electrification. MDHV (medium- and heavy-duty vehicle) electrification delays result in lower emissions reductions. Delays may result in meeting the state's clean transportation goals.

7. Slide 8: next steps and recommendations
 1. Better understanding of impacts of costs and timing delays
 2. Managed charging can defray costs
 3. Utility analysis on the utility side infrastructure feasibility will be critical input
 4. Create a process with utility to help fleets to understand their net costs for EVSE infrastructure
 5. (See slide)
8. Judge asked what the actual process is to invite participants in the program? Kritzler replied that both National Grid and Eversource are partners and offer recommendations on participants. Takle added that they work with nonprofit fleets and help them go through the implementation part—and this is the challenging “chicken and egg” part, where the total cost is hard to get from the utilities without a thumbs up that they’re ready to go on the project. Total cost is contingent upon several variables—maybe 80-90% of costs will be paid for, but that’s not clear.
9. Judge asked when there’s an upgrade that gets triggered, how is the utility assessing that cost to the customer? Some costs are being paid for through incentives, but how is the utility evaluating and communicating the need for those upgrades? Takle said the Make-Ready application is when they clue you into the customer-side costs. The minimum is a commitment for a significant number of stations. The solar interconnection process is a great analogy. Judge said he didn’t know that this is necessary in the EV space, but was curious as to whether the process is working well for customers. In the absence of the Make-Ready incentives, what would the process be? Is there a dialogue with the utilities? One of the things that can be an issue here too is with storage; utilities assume the worst-case possible scenario of the battery charging at a peak time and then modeling the system based off of that. Does that same kind of analysis happen here? Are we using all this equipment at peak at the same time, and is that what the costs are based off of? What can we do to make sure that these upgrades are being modeled in such a way that this type of analysis is being taken into account? That is one way we can avoid excessive T&D assessments. Takle said that without Make-Ready incentives, the contractor has to work it out with the utility. She has not seen a managed charging benefit factored into the analysis. Judge said it seemed that we need to find a way to make sure we are optimizing the way T&D is being utilized.
10. Lamontagne said that it’s true that when you want to interconnect a lot of charging units, that does put the utilities over our limit and what upgrades do we need to make, and it requires studies and time. How much folks will have to pay is a very complicated formula. Right now, storage and other managed charging is not being looked at, but it’s something we’ll want to take into consideration. Are there other most cost-effective methods of building out T&D before going all out?
11. Gold said there are a number of topics being discussed about National Grid programs. Under current programs, the Make-Ready programs cover utility-side work that needs to be done to interconnect those chargers. Lamontagne mentioned Contribution and Aid of Construction (CAAC, pronounced kayak), which is covered under the utility programs. A significant amount will be covered. Gold further explained that CAAC has to do with the ratio of what consumer’s load requesting vs. contribution of utilization. Lamontagne said that if a customer is requiring more service than a typical upgrade, they want to return some of those costs to the consumer. The calculation looks at how much revenue the utilities get from use and subtract that out. This was developed for large generators wanting to connect, and not designed for EV chargers specifically, especially not single-family homes. There’s a kind of first-come first-serve concept that doesn’t work well for EV charging—we need to think about how to do this differently, in that one person who moves capacity over the line pays for

it, and those after that threshold don't have to pay for it. Judge said there must be some way to rethink this cost causation principle. No one in the country has figured this out.

12. Horst offered that perhaps this is something we should suggest as the Council in our initial assessment, that we or DPU or otherwise to look into this further. Judge said he had been thinking about this extensively and thinks GMAC is really the best way to address a lot of these issues, because they are socializing a lot of larger upgrades to avoid situations where a single customer is triggering it. That said, there is no silver bullet on that yet, but proactive planning will hopefully help. There are limits on how much infrastructure requires this major upgrade.

c. Colette Lamontagne, National Grid, and Dave Mullaney, Rocky Mountain Institute

1. Lamontagne and Mullaney presented on National Grid and RMI's joint electric highways study.
2. Lamontagne presented:
 1. Slide 2 describes an overview of National Grid USA and its Northeast customer map area. National Grid itself is trying to electrify 1,600 fleet vehicles by 2030.
 2. Slide 3 reviews the importance of planning for EV charging. We know that Massachusetts and New York have ambitious targets that are coming up quickly. This encompasses not just light-duty, but medium- and heavy-duty vehicles that could have a major impact on what load is required. National Grid has been doing studies looking at meeting demands at the time and volume of charging required. They're looking at what we need to do to upgrade substations on the grid and how to do it in the fastest and most cost-effective way. They're looking at working with MassDOT to determine where to make upgrades.
3. Mullaney presented:
 1. He works specifically with truck charging at RMI. The goal of the study was to figure out what a charging network corridor would look like to cater to light to heavy-duty vehicles. They tried to look at key corridors across Massachusetts and New York where each charger is 30–50 miles apart. All stations had to be approximate to the highway, either directly on or very close to an exit. These also had to be proximal to a transmission and substation infrastructure. Preferably there would be commercial activity for the site.
 2. Slide 5: the study looks at what vehicles are stopping, and where, and how long are they staying. Combined that with adoption projections based on how quickly these vehicles will electrify. For a large truck stop, by 2035, we would be looking at peak daily loads of up to 10 MW, which is a decent sized load. The graphs on the right show that at about 6 p.m., truck stops will be collectively drawing about 10 MW of power. Managed infrastructure will help alleviate this, but this is the worst-case scenario that utilities should be planning for.
 3. Slide 6: how all peak loads will progress over time. The problem is it's relatively imminent: a typical power limit for a distribution circuit is about 5 MW. There is the problem that most stations won't be able to accommodate loads required, and growth will only make the problem more challenging. Thus, we have to start the building process relatively soon, as these are long lead times; but we can't just build for five-year demand—we need to keep infrastructure and not overbuild, but also strike a balance in anticipating future needs.
4. Lamontagne presented:

1. Slide 7: one of the big takeaways is that we need to try to align the time to install EV chargers and upgrades required to distribution lines and substations. It could be one to four years. Updating transmission interconnection and upgrades is 4-8 years, so we need to start working on it now. What's holding us back is we need to wait until an EV charging developer comes and declares intent. How do we change the rules to make it more appropriate to develop infrastructure for EV charging?
2. Slide 8: coordinating planning and deployment of highway (and fleet) charging, specifically regarding long-haul trucks and not just commuters; where are places that are also closest to T&D so the costs of upgrades will be minimized? By being proactive and intentional in planning, it will help drive down costs, avoid long wait times, seamlessly enable the EV transition (get rid of range anxiety), improve air quality, and achieve climate mandates and market development.
3. Slide 9: a copy of the report is available at nationalgrid.com/us/evhighway.
5. Judge said this was a good backdrop to help us think about how to plan ahead and create investments that will address these near, mid- and long-term needs to upgrade the electric grid. EVICC is still in the early days in that process as well. Also, we may look to some of the presenters from today to provide some data and to do some high-level assessment for some T&D needs and get some sense of the magnitude of the costs.
6. Gatti added that National Grid did take a look at managed charging and asked what potential they saw there to reduce some costs? Lamontagne said that they looked at storage at the highway sites and doesn't think that it's helpful in those cases, as those are people mid-trip. They looked at four sites, and of those four, they found that storage could defer the cost of T&D for about five years, which would not only help have the time to build, but it would be cheaper. Judge said managed charging does not fully replace need, but delays a need to build out infrastructure; it's an interesting avenue to explore as a way to deter additional investments. Lamontagne added that they found in all four of the sites studied, there was no way to eliminate the need for T&D. There was another study of an industrial area with multiple depots, not one specific site in MA. Gideon Katsh, National Grid, looked at storage on fleet work; he contributed to a study on load forecasting looking at grid impacts and solutions. They have a couple of scenarios looking at managed charging for summer and winter. There is potential to ensure we can mitigate system impacts, but there is a bit more to do.
7. Judge asked for clarification on how big the loads were in Katsh's study. Katsh said they looked at load growth from 2 MW to 20 MW as fleets electrify. The line itself has extra capacity. Storage goes up starting 5 MW over about 6 hours, but we need to get to about 10–20 MW of storage. Lamontagne added that with fleet analysis, they think managed charging plays a bigger role there, but it depends on the customer—school buses parked all night, delivery trucks parked during the day, etc.
8. Judge asked if there was an exploration of the ability for other customer-owned and managed loads? If there was a program that could dispatch a solar plus storage facility owned by a third party and they would be compensated for dispatching at certain times, and if it's served by the same substation, could one get the same benefits as a company asset? Lamontagne said everything is site-specific and every situation is different, but if there are DER resources, that could support it as well. Judge said there's a lot of interest in solar power plants and to keep that in mind. Are there other assets to mitigate potential upgrade needs? Lamontagne said that one barrier has been with storage, third-party or National Grid owned, and they do not have the ability to control it in real time at this moment. Modeling is using the worst-case scenario. As they build out their

system, that will make it easier to install and use storage, and also to take advantage of these other distributed energy resources.

9. Gatti suggested that with some of the numbers we're seeing, it's not just cost, but a supply-chain issue. Is it really possible to build the kind of transmission we need, keeping in mind the electrification of the building sector? Maybe we're going to need to figure out that storage type solutions are accounted for in how we think about accommodating need, since T&D is going to be slow in keeping up.
10. Edington said she was hearing a lot of thinking about the system holistically, grid modernization, transportation electric demand, etc., and is looking forward to the ESMP draft to incorporate all of these elements. She's asking for confirmation that everyone is coordinating across departments and the strategic decisions are coming together. Lamontagne said yes, they are working very hard to advise the GMAC and are working on how they can indicate the level of effort and upgrades and costs that they think will come about between now and 2050 without knowing exactly where yet. Edington said that at least knowing the challenges we have today, this is our plan to address some of these. How can we get ahead of that so we're not behind. Lamontagne said that Judge is right that it's a lot of effort to build out T&D, so we need to think about how to build those workforce capabilities and supply chain, etc. Judge said it's not every circuit, but some have a high attrition of distributed resources.
11. Frongelli asked at what point do we consider one of the things that came to us recently were independent, relatively inexpensive half-solar, half-fuel (low-carbon) that could be charging (250K propane with solar on top) and charge right out of that. Might there be a need for that as a transition? Judge clarified that this was a type of generator; Frongelli confirmed. Gatti said this type of thing is also done with hydrogen. Judge said we want to avoid the use of fossil fuels, but if there's reliability concerns and issues with deploying other technologies, that could be on the table.

c. Chip Silverman, FreeWire

12. Silverman introduced FreeWire's solution of battery-integrated chargers called the Boost product series.
 1. Slide 3: the problem is that there is insufficient grid infrastructure to support demand for beneficial electrification projects, either buildings or vehicles. National Grid's electric highway study is fantastic and is a great start in quantifying the needs in meeting the policy objectives. In California, they recently came out with a comprehensive study showing \$50 billion in grid upgrades needed, the majority of which would be to support transportation.
 2. Slide 4: product is a DCFC with integrated 160 kWh battery pack. This minimizes grid impact because (slide 5) the charging comes from the grid but uses low charging input. In the next six months, there will be Boost Pro and Boost Power with bidirectional inverters to provide other grid services and energy site services as well.
 3. Slide 7: charger enables a lot of flexibility as well, which can work with a lot of higher voltages. This is particularly helpful in rural areas. The battery integration facilitates managed charging, because we can charge the battery during low demand periods and still offer high-speed charging.
 4. Slide 8 showed a map of FreeWire products' global presence.
 5. Slide 10: grid benefits include the pace of installing charging stations being significantly faster—weeks vs. years (in some cases three years). This slows down electrification and can ultimately prevent the success of

the states' goals. Battery-powered chargers avoid deferral of green infrastructure.

6. Slide 11: VGI (vehicle grid integration)—technologies enable load flexibility. This is a way to support the grid in beneficial electrification pursuits.
7. Slide 12: customer benefits—chargers are lower in cost and have lower power requirements.
8. Slide 17: recommendations to accelerate beneficial electrification:
 1. Encourages customers to manage their grid impact—it's hard for customers to know when to do this. A prescriptive incentive would be based on shared savings of avoided/deferred upgrades. One-off make-ready programs are challenging for customers.
 2. Proactive grid planning should include primary and secondary distribution grid and improved hosting capacity maps. Ideally, it would be great that when a developer goes in and works with a customer, they could tell that person what options they have.
 3. Bottom-up beneficial electrification should include non-highway sites.
13. Gatti asked Silverman about the National Grid / RMI study—when he sees the megawatts projected in terms of need, are FreeWire's solutions scalable to that level? And the charging speed capability is currently maxed at 200 kWh; is there a limitation to that? Silverman said that in terms of solving large truck stop capacity constraints, FreeWire's solution today is targeted primarily at light-duty and medium-duty, and heavy-duty en route charging. They are developing additional products with larger battery capacities. So the answer is yes: this is scalable. Whether FreeWire can solve all of these issues, he can't comment; but batteries can defer grid upgrades for an average of five years—which is valuable time, because in some cases we need to electrify now, and we need to find a solution that's appropriate right now. He noted that FreeWire is not the only company doing this; even some of the larger charging providers (Tesla, Electrify America) are installing batteries in conjunction with some of their larger charging sites.
14. Gatti asked if there is a difference between at the substation and charging level? Silverman said there's a difference in the integration of the solution. Their charger is less complex in that it's all in one. But there are different solutions, and the advantage is that it reduces the complexity. Judge said that this solution is dramatically reducing the size of the interconnection to the grid, but this doesn't negate the possibility or need to build a substation to manage the total load. Ultimately there may need to be an all-of-the-above approach.
15. Gold asked if Silverman could share an example of how their chargers are working in areas where you have higher utilization? What does a daily cycle of EV drivers look like? How does this product differ from a customer experience vs. a standard 200 kW charger? Silverman said the short answer is there's no difference—a customer shouldn't have to think about what charger they're using. They designed their solution to be simple. From an operator's perspective, they will know; FreeWire has software that enables monitoring of battery usage, etc. As for statistics on battery depletion, right now they have several hundred deployed across the world, and there is no data on depletion because there aren't enough EVs on the road. He also noted that the battery is simultaneously recharging while it's dispensing an electric load. Some sites have 16-25 chargings per day and they are not depleting battery capacity. Other charging providers will tell you that when they start seeing utilization of 10, 15, 20 charges per day, they want to put in additional chargers because they are concerned about queues forming—this is no different. Battery depletion risk is not necessarily the most challenging.

16. Gatti asked if Massachusetts' high demand charges was a challenge. Silverman said yes—from a customer perspective, they lose an important signal to manage their load. So to combine that with significant make-ready incentives, if the customers don't see any share of the savings of avoiding or deferring the grid upgrade, there's very little incentive to manage load. Those are tough policy issues for FreeWire. He believes there should be customer choice here and an incentive to manage the load.

5. Public comment / Q&A

- a. DOER alum Steve Russell—workplace charging should be added to the outline of the initial assessment.
- b. Anna Vanderspek, GECA—this has been such an interesting conversation and has touched on so many big, thorny topics that will take more to unravel. She would encourage that the draft we're working on identify the pieces that still need more conversation and what agency or stakeholders are tasked with continuing the conversation. Doesn't want to have gotten to the heart of some of these issues and not come back to it. Would like to see a mechanism in that assessment that points to who's going to tackle the next steps.

6. Wrap-up and next steps

- a. Follow-up with draft outline and assignments
- b. Coordinate smaller calls; this will be the focus of conversations in following weeks
- c. The next EVICC meeting is July 20, 2023
- d. A public hearing is scheduled for July 19 at UMass Dartmouth
- e. A public hearing is scheduled for July 26 at Holyoke Community College
- f. A final public hearing will be in Boston, possibly in July
- g. Rubin asked who will be doing a presentation at public hearings to introduce the work of EVICC. Judge said there is a write-up about this and some questions for attendees, which we will send out and get individual feedback.
- h. Edington asked if virtual/hybrid be an option, to which Judge replied hopefully—we're working out the logistics. It's been a learning experience to get a more centralized process for running public meetings.

7. Adjourn

- a. Rubin moved to adjourn. Edington seconded. The motion passed unanimously and the meeting adjourned at 3:21 p.m.

Respectfully submitted,
GreenerU