NARUC Electric Vehicles State Working Group

OCTOBER MEETING – MEDIUM AND HEAVY-DUTY VEHICLE CHARGING PART 2

OCTOBER 24, 2023, 3:00 - 4:30 PM
Welcome

EV SWG Chair
Commissioner Katherine Peretick, Michigan Public Service Commission

EV SWG Vice Chair
Commissioner Milt Doumit, Washington Utilities and Transportation Commission

NARUC Staff
Danielle Sass Byrnett and Robert Bennett
<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation/Session</th>
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| 3:00 PM | Welcome and Announcements – Commissioner Katherine Peretick (10 min.)  
- Agenda review  
- Announcements |
| 3:10 PM | Britta Gross, Director of Transportation, EPRI (15 min.) |
| 3:25 PM | Pamela MacDougall, Director Grid Modernization Strategy, Environmental Defense Fund (EDF) (15 min.) |
| 3:40 PM | Jacqueline Piero, US Head of Policy & Regulatory, The Mobility Project (15 min.) |
| 3:55 PM | Speaker Q&A (15 min.) |
| 4:10 PM | Peer Sharing Discussion (20 min.) |
| 4:30 PM | Adjourn |

Registration is still open, and the La Quinta hotel is sold out.

NARUC & DOE will host a Transportation Electrification Planning Workshop on Wednesday, November 15th from 1:00-5:00 pm PT after the NARUC Annual Meeting at the La Quinta Resort and Club in La Quinta, CA.

NARUC Annual Conference registration is not required.

During this interactive workshop, attendees will hear and discuss lessons learned from members and experts about transportation electrification planning approaches and develop initial thoughts about promising approaches to carry into the next planning stages. Register in advance with this link.
Welcome

**Moderator:** Commissioner Katherine Peretick, Michigan PSC

**Guest Speakers**
- Britta Gross, Director of Transportation, EPRI
- Pamela MacDougall, Director of Grid Modernization Strategy, EDF
- Jacqueline Piero, US Head of Policy & Regulatory, The Mobility Project
NARUC EV State Working Group
24 October 2023

Britta K. Gross
EPRI, Director of Transportation
Background and Objectives

- Government, Industry, and Fleets are increasingly aligning on aggressive 2030 vehicle electrification goals

- The pace of needed year-over-year action and investment to prepare charging sites and the grid is not clear

- Consumers and fleet operators must have confidence in charging availability, reliability, and affordability

- Consumers and fleets operators are increasingly looking to the utility industry to scale up efforts to support charging solutions, ensure the grid is capable of meeting vehicle loads

**THIS TRANSITION IS UNPRECEDENTED AND COMPLEX. ITRequires:**

- Extraordinary collaboration and partnering across all the major EV stakeholder groups

- Redesigned processes, useful tools, and increased standardization to simplify the planning and complex interactions between major stakeholder groups

- An evaluation of regulatory/board oversight that may not be conducive to driving actions on the pace and scale required to meet 2030 targets
Addressing the Barriers to Achieving EVs at Scale
A Three-Pillar Strategy

**1. Coalitions & Roadmaps**
- Bilateral Convening Series
  - Utility-OEM Forum
  - Utility-Fleet Forum
- National EV Driver Research Board
- 50-state eRoadMAP™ to 2030
  outlining EV loads, grid impacts, leadtimes, workforce, costs

**2. Structural System Reforms**
- Charging Infrastructure
  - Reliability: Benchmarking, Standards
  - Charging innovation & affordability
- Grid Readiness
  - Streamlined Grid Interconnect
    - Expedited Interim Charging Solutions
  - Managed Charging at Scale
  - Interconnect Standards for V2H/V2B/V2G

**3. Unifying Tools & Pilots**
- Approved Product List (APL)
- NEVI/NEHC Coordination with EEI
- GridFAST™ Online Data Exchange
- OEM/Utility V2H/V2B Pilot
- EV Resilience/Evacuation Pilot

**Enabling Regulatory and Oversight Framework**

**Equity Blueprint & Workforce Development**
Addressing the Barriers to Achieving EVs at Scale
A Three-Pillar Strategy

**COALITIONS & ROADMAPS**
- Bilateral Convening Series
  - Utility-OEM Forum
  - Utility-Fleet Forum
- National EV Driver Research Board
- 50-state eRoadMAP™ to 2030 outlining EV loads, grid impacts, leadtimes, workforce, costs

**STRUCTURAL SYSTEM REFORMS**
- Charging Infrastructure
  - Reliability: Benchmarking, Standards
  - Charging innovation & affordability
- Grid Readiness
  - Streamlined Grid Interconnect
    - Expedited Interim Charging Solutions
  - Managed Charging at Scale
  - Interconnect Standards for V2H/V2B/V2G

**UNIFYING TOOLS & PILOTS**
- Approved Product List (APL)
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Enabling Regulatory and Oversight Framework
Equity Blueprint & Workforce Development
Collaboration + Partnerships
Ongoing Outreach

- Joint Office of Energy & Transportation (JOET)
- US DOE
- US DOT
- National Labs
- FERC/NERC
- State DOEs, DOTs, DEQs
- State PUCs
- League of Cities
- Climate Mayors

Utility Industry
- EPRl
- LPPC
- EEI
- NRECA
- American Public Power Association
- Alliance for Transportation Electrification
- NASUCU
- NARUC
- NACFE

Auto & Trucking Industry
- Ford
- BMW
- Volvo
- Daimler
- Rivian
- Toyota
- Paccar
- GM
- Honda
- Alliance for Automotive Innovation

Fleet Operators
- Amazon
- Penske
- Uber
- Lyft
- Walmart
- PPG
- FedEx
- J.B. Hunt
- NADA
- NAPA
- SAE

Charging Providers and Fueling Retailers
- Electrify America
- ChargePoint
- EVgo
- BP
- Plug In America
- Electric Vehicle Association

NGO & Standard-Setting Organizations
- NRDC
- EDF
- AARMI
- NRDC
- CHARIN

Government
- Federal Energy Regulatory Commission (FERC)
- National Electric Reliability Corporation (NERC)
- State DOEs, DOTs, DEQs
- State PUCs
- League of Cities
- Climate Mayors

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EVs2Scale2030 Advisory Board

Chair: Xcel, Brett Carter
Co-Chair: PG&E, Patti Poppe

AAI, John Bozzella
Amazon, Sujit Mandal
Ameren, Mark Fronmuller
APPAl, Paul Zummo
ATE, Phil Jones
ComEd, Gil Quiniones
Daimler Truck, Diego Quevedo
EEI, Kellen Schefter

GRE, Jeff Haase
JOET, Rachael Nealer
LCRA, Khalil Shalabi
NARUC, Katherine Peretick (Michigan PSC)
National Grid, Rudy Wynter
NRECA, Angela Strickland
NYPAl, Fabio Mantovani
Southern Company, Chris Cummiskey
Regulatory/Board Oversight Workstream: Why is proactive grid infrastructure build so challenging?

Utilities **not confident** in the timing/pace of EV adoption across their service territories (demand varies across the U.S.)

Regulators **not confident** in the timing/pace of EV adoption (hearing only the voice of utilities); want to avoid stranded assets. Unclear on the cost impacts to ratepayers of proactive grid infrastructure build vs. later build

Ratepayer advocates **not confident** in the timing/pace of EV adoption and the need for proactive grid build; concerns on the cost impacts

EVs2scale2030 data will send clear demand signals, **building confidence**, and enabling utilities (and regulators) to prioritize “no regret” investments.
Improved Data Resolution Techniques

1. **Layered Data Approach**

   - **LD Vehicles**
     - Registrations
     - Travel Models
   - **MDHD Vehicles**
     - OEM data
     - Fleet data
     - Travel Data
   - **Other Vehicle Sectors**
     - Transit/School Buses
     - Government Fleets
     - Ports/Airports
     - Vocational Fleets
   - **Other Load Data**
     - EVSPs/Fueling Retailers

   - H3 – Level 8 Maps

   - One map with energy + power needs

   *EV Service Providers

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<th>Average Hexagon Area (mi²)</th>
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Where Hex8 ~ 1 or 2 feeders
LD + MDHD | 100% Electrified

H8 – 0.28 sq miles per hex

H5 – 98 sq miles per hex
Light-Duty
Residential Charging Energy Required Over Time

Legend (MWh/day)
- < 1 MWh
- 1-3 MWh
- 3-5 MWh
- 5-10 MWh
- 10-15 MWh
- 15-25 MWh
- 25 MWh +
Medium and Heavy-Duty
Return to Depot Charging Energy Required Over Time

2023

2030 (Policy Compliance)

100% Electrified

Legend (MWh/day)

< 1 MWh
1-3 MWh
3-5 MWh
5-10 MWh
10-15 MWh
15-25 MWh
25 MWh +
MDHD Depot Case Study - 100% Electrified

Companies:
- Pacific Urethanes -
- Blue Triton Brands – drink company
- Nabisco Foods
- West Rock Corrugated Container
- IIT Champagne – Champagne delivery
- Ray Products- Plastic company
- Bishamon Industries – metal handling
- RICH solar
- Coca Cola Co

MWh/Day per Hex

- < 3.0 MWh
- 3.0-5.0 MWh
- 5.0-10.0 MWh
- 10.0-30.0 MWh
- 30.0-50.0 MWh
- 50.0-100.0 MWh
- 100.0-200.0 MWh
- 200.0 MWh+
How might we help EV customers and utilities get *actionable* information, *earlier* in this process?
GridFAST

Improve transparency in EV charging planning to inform grid investments and accelerate grid interconnects

2023-2035 plans defining loads, locations, timing

Utility hosting capacity – or proxies – indicating grid readiness, timing to support EV charging loads

GridFAST Secure online data exchange platform
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Enabling Regulatory and Oversight Framework
Equity Blueprint & Workforce Development

Red: Expected to heavily inform the regulatory workstream
**Proposed Deliverable:**
A 50-State/National Outreach Package for regulators, legislators, consumer advocates, and federal agencies that leverages eRoadMAP™ and GridFAST™ to build a case for proactive grid investment that enables timely scale

- **Economic Opportunities** (battery plants, assembly plants, EVSE,...)
- **In-State Revenue Opportunities** (electricity sales/taxes, downward pressure on rates)
- **Industry Support** (letters of support, PUC hearings,...)
- **Load Forecasting Data Analysis** (near-term priorities) eRoadMAP™
- **Grid Impact Analysis** (substation and feeder level priorities) eRoadMAP™
- **Leadtime Impacts**
  - Costs (potential solutions and approaches to who pays)

**By State:**

**Nationally:**

- **Supply Chain Impacts** (transformers, switch gear,...)
- **Grid-Side Costs** (potential solutions and approaches to who pays)
- **IOU vs. Public Power vs. Rural Coop**
Released Reports + Tools

1. EVs2Scale Website
2. VPL (Vetted Product List)
3. Grid Primer
4. EV Charging Reliability Analysis

Mark your calendars:
EPRI’s “Electrification 2024” Conference in Savannah, GA 12-14 March, 2024
Thank You
Covering Distribution Costs Without Increasing Rates

- Serving load from electric MHDVs will require significant investments in specific areas on the distribution grid
- Utilities can make these investments, and accelerate truck electrification, without harming existing ratepayers
Covering Distribution Costs Without Increasing Rates

- Forward-looking study covers two utility service territories: Con Edison and western New York portion of National Grid
- Analyzed cost of the distribution system upgrades and make-ready necessary to support 100 percent electric MHDV sales by 2045, and expected revenue from this new load
- Modest managed charging can improve net revenues by reducing grid expansion costs, particularly in lower-density service territories
Synapse Results: Con Edison & National Grid (with Unmanaged Charging)

- Con Edison Net Revenues: ~ $820 million
- National Grid Net Revenues: ~ $320 thousand
Synapse Results: Con Edison & National Grid (with Managed Charging)

Con Edison Net Revenues
~ $690 million

National Grid Net Revenues
~ $89 million
Facilitating Energization and Mitigating Risks in Truck Electrification
Updating Grid Planning for Electric Trucks

- Significant new load
- Uneven distribution
- Long-term forecasting and planning efforts
- Short-term mitigating solutions
Bottom-Up Forecasting for Electric Trucks

- Leveraging better data
  - OEM telematics
  - Mapping
  - EPRI EVs2Scale2030
  - Direct fleet outreach

Example of fleet mapping by Con Edison
Planning Across Regions, Timelines, and Loads

- Multi-territory, multi-agency planning
  - California – Freight Infrastructure Plan
- Multiple end uses
  - New Jersey – Grid Modernization, Energy Master Plan
- Long time horizons
  - New York – Coordinated Grid Planning Process
Proactive Distribution System Expansion

- Building to meet needs, not react to them
- Widespread truck electrification will require coordinated system planning
- Utilities in several states are starting to plan around fleet clusters
  - North Carolina – Duke Energy Rate Cases
  - California – AB 2700
  - New York – S4830, MHDV Planning Proceeding
Short-Term Solutions to Meet Fleets’ Needs

• Non-Wires Alternatives
• Flexible Interconnection
• Third-party construction
Summary

- New data sources are improving forecast accuracy
- Better planning processes are more reflective of the realities of this transition
- Short-term solutions are ready to fill in gaps where they show up
Thank you!
Feel free to connect: pmacdougall@edf.org
Automated load management: A tool for utility EV infrastructure planning
The Most Experienced Fleet Charging Company Worldwide

Smart Charging
ChargePilot - The world’s leading EV charging and management platform designed just for fleets.

Vehicle-Grid Integration
EV Aggregation Platform for monetization of EV battery flexibility & energy markets.

Stationary Storage
Largest developer of stationary storage solutions using EV batteries in the EU.

Consulting & Solutions
Professional services from charging expert Consulting to complete Turnkey Solutions.

Trusted by 1200+ EV Fleets

10+ Value generating energy & grid services enabled

100+ MW Capacity installed or in construction

180+ Fleets Helped

Customers, Partners & Investors Include

DAIMLER
Mercedes-Benz
RENAULT NISSAN MITSUBISHI
AlphaStruxure
King County
NEW FLYER
MITSUBISHI CO.
ALM sets a safe limit on total site usage

While allowing EVSEs their full charging capacity

- 4 - 150 kW Chargers
- 500 kW transformer

150 kW 150 kW 150 kW 150 kW

4* 150 KW = 600 kW of Load
Transformer Rated to 80% = 400 KW of space
Transit: Enabling electrification now*

- **LOCATION:** California
  - **TOTAL CONTROLLED POWER:** 1.8 MW
  - **EV-DEDICATED CONNECTION LIMIT:** 1.4 MW
  - **CHARGING STATIONS:** 10 x 180 kW dual port DC

- **LOCATION:** New York
  - **TOTAL CONTROLLED POWER:** 288-384 kW
  - **CONNECTION SIZE:** ~80 kW
  - **CHARGING STATIONS:** 15-20 x 19.2 kW AC
    (Deferring Phase 1 upgrade, planning for Phase 2)

- **LOCATION:** Rhode Island
  - **TOTAL CONTROLLED POWER:** 1.8 MW
  - **CONNECTION SIZE:**
    - Grid-connected: 1.4 MW
    - Back-up generation: 540 kW
  - **CHARGING STATIONS:** 4 x 450 kW DC chargers

(*Sites in progress/unannounced)
Load management allows chargers to use full capacity when needed

Irish Post site with 12 AC chargers
Site connection: 28.9 kW
EVSE nameplate: 88.32 kW
Key takeaways from eight studies on EV grid impacts:

- Light-duty will be bulk of EVs, but MD/HD fleets will cause the bulk of grid impacts
- Advanced Clean Trucks states*, and industrialized areas will see more of those impacts before 2030
- Transit and school bus funding is federal and unpredictable
- Unmanaged EV load may increase peak load by 30%

MD/HD forecast peak charging load by county
(International Council on Clean Transportation, May 2023)

*CA, OR, WA, MA, VT, NY, NJ, CO
Coincident Load is the key to flexible connections

Source: GridLab "2035 Report: Distribution Grid Cost Impacts Driven By Transportation Electrification". June 2021
Thank you!

Jacqueline Piero
us-sales@mobilityhouse.com
+1 (650) 232-4200

The Mobility House LLC
545 Harbor Blvd
Belmont, CA 94002
# Site upgrade deferral vs. grid upgrade deferral

<table>
<thead>
<tr>
<th>Static site limit</th>
<th>Dynamic Hosting Capacity</th>
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<tbody>
<tr>
<td><strong>Method</strong></td>
<td>• Contractual agreement to temporarily curtail aggregate usage during predetermined periods</td>
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<tr>
<td>• Consistent, hard limit on aggregate kW usage</td>
<td>• Feeder/transformers/substation</td>
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<tr>
<td><strong>Intended impact</strong></td>
<td>• Site connection: panel and internal overcurrent protections</td>
</tr>
<tr>
<td>• Site connection: panel and internal overcurrent protections</td>
<td>• Life of site</td>
</tr>
<tr>
<td>• Life of site</td>
<td>• Until primary distribution infra is upgraded</td>
</tr>
<tr>
<td>• Until electrified fleet increases</td>
<td></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>• Notification and trigger likely similar to DR</td>
</tr>
<tr>
<td>• No external signal</td>
<td>• Text/Email</td>
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<tr>
<td>• Utility involvement is always the best practice!</td>
<td>• Via smart meter</td>
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<tr>
<td>• AHJ approval necessary</td>
<td>• API</td>
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<tr>
<td><strong>Utility involvement</strong></td>
<td>• DERMS comms</td>
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<td>• Utility coordination is essential</td>
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<td><strong>Planning impact</strong></td>
<td>• Medium- to long-term infra planning &amp; investment</td>
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<td>• Short term/upon energization request</td>
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<td><strong>Value</strong></td>
<td>• Multiple customers’ ability to energize at all</td>
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<tr>
<td>• Single customer time to energization</td>
<td>• $$</td>
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</tbody>
</table>
Q and A

**Moderator:** Commissioner Katherine Peretick, Michigan PSC

**Guest Speakers**
- Britta Gross, Director of Transportation, EPRI
- Pamela MacDougall, Director of Grid Modernization Strategy, EDF
• **What M&HD charging issues are facing public utility commissions?** For example, are M&HD charging issues wrapped separately or within transportation electrification plans, within overall distribution system investment plans, only in stakeholder discussions, general rate cases, etc.?

• **Where is assistance needed for PUCs to help plan for these M&HD charging issues?**
The next EVSWG meeting will be November 28, 3:00-4:30 pm ET

HTTPS://WWW.NARUC.ORG/CPI-1/ENERGY-Customers/Electric-Vehicles/
Announcements

The NARUC EV Getting Started Guide is now live!
Appendix: Resources for Reference

- **DOE’s EV Grid Assist webinar series** (June – November) recordings are posted at: [www.energy.gov/eere/evgrid-assist-accelerating-transition](http://www.energy.gov/eere/evgrid-assist-accelerating-transition)

- **Presentations and recordings of past EVSWG events** are available on the NARUC website: [www.naruc.org/cpi-1/energy-infrastructure-modernization/electric-vehicles/](http://www.naruc.org/cpi-1/energy-infrastructure-modernization/electric-vehicles/)

- **EVSWG Listserv**: NARUC-EVSWG@lists.naruc.org

- **ICYMI – 4 NARUC EV publications** released late 2022:
  - [Models for Incorporating Equity in Transportation Electrification](http://example.com)
  - [Electric Vehicle Interoperability: Considerations for Public Utility Regulators](http://example.com)
  - [Considering Interoperability for Electric Vehicle Charging: A Commission Case Study](http://example.com)
  - [Transportation Electrification: State Level Roles and Collaboration among Public Utility Commissions, State Energy Offices, and Departments of Transportation](http://example.com)