



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

Agenda

*Feel free to enter
questions into chat at
any time*

3:00 PM	Welcome and Announcements – Commissioner Katherine Peretick (10 min.) <ul style="list-style-type: none">• 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

Announcements

- ▶ **NARUC Annual Meeting and Education Conference** in **La Quinta, CA** from **November 12-15, 2023**.
 - ▶ **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. IT REQUIRES:

-  **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

Enabling Regulatory and Oversight Framework

Equity Blueprint & Workforce Development

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

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Collaboration + Partnerships

Ongoing Outreach



UTILITY INDUSTRY



AUTO & TRUCKING INDUSTRY



FLEET OPERATORS



CHARGING PROVIDERS AND FUELING RETAILERS



NGO & STANDARD-SETTING ORGANIZATIONS



GOVERNMENT

- 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

EVs2Scale2030 Advisory Board



Chair: **Xcel**, Brett Carter

Co-Chair: **PG&E**, Patti Poppe

AAI, John Bozzella

Amazon, Sujit Mandal

Ameren, Mark Fronmuller

APPA, Paul Zummo

ATE, Phil Jones

ComEd, Gil Quiniones

Daimler Truck, Diego Quevedo

EEI, Kellen Scheffer

GRE, Jeff Haase

JOET, Rachael Nealer

LCRA, Khalil Shalabi

NARUC, Katherine Peretick (Michigan PSC)

National Grid, Rudy Wynter

NRECA, Angela Strickland

NYPA, Fabio Mantovani

Southern Company, Chris Cummiskey



PROJECT PARTNERS

BROAD INDUSTRY SUPPORT



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

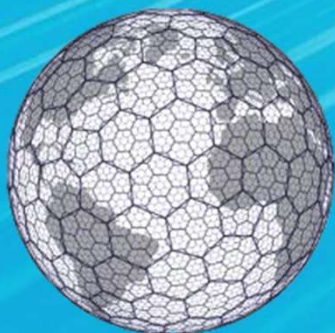
Ratepayer advocates **not confident** in the timing/pace of EV adoption and the need for proactive grid build; concerns on the cost impacts

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

1 Improved Data Resolution Techniques

Res	Average Hexagon Area (km ²)	Average Hexagon Area (mi ²)
0	4,357,449.42	1,682,419.93
1	609,788.44	235,440.54
2	86,801.78	33,514.34
3	12,393.43	4,785.13
4	1,770.35	683.53
5	252.90	97.65
6	36.13	13.95
7	5.16	1.99
8	0.74	0.28
9	0.11	0.04
10	0.0150	0.0058
11	0.0021	0.0008
12	0.0003	0.0001

Where Hex8 ~ 1 or 2 feeders



2 LAYERED DATA APPROACH

LD Vehicles

- Registrations
- Travel Models

MDHD Vehicles

- OEM data
- Fleet data
- Travel Data

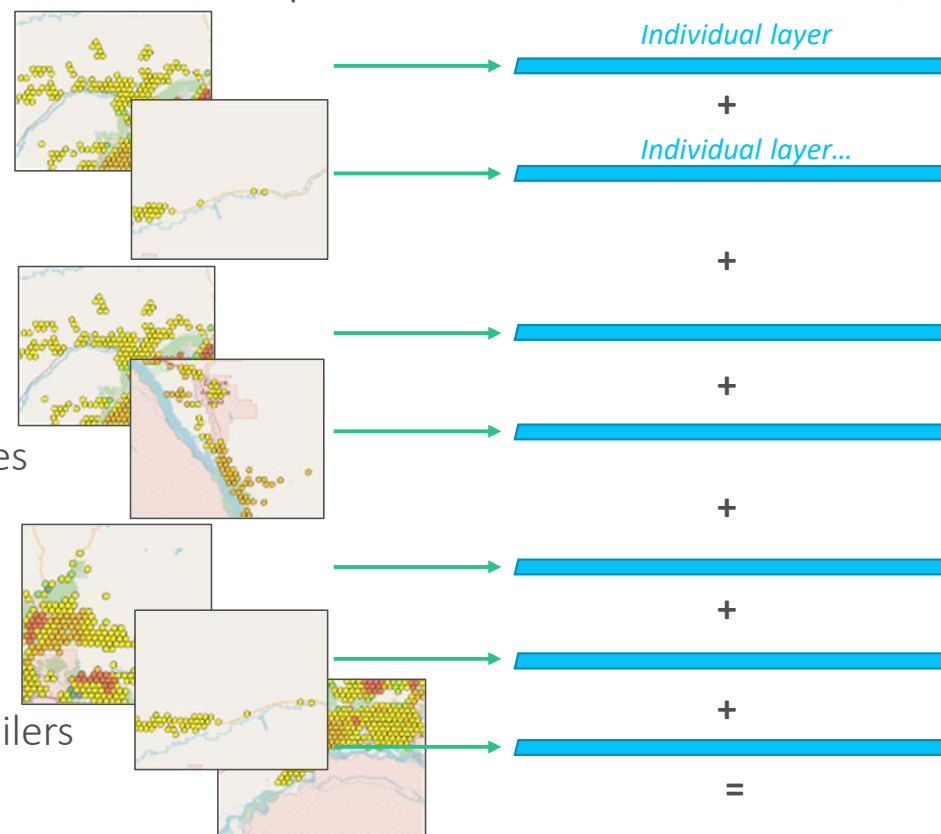
Other Vehicle Sectors

- 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

ANALYTICS



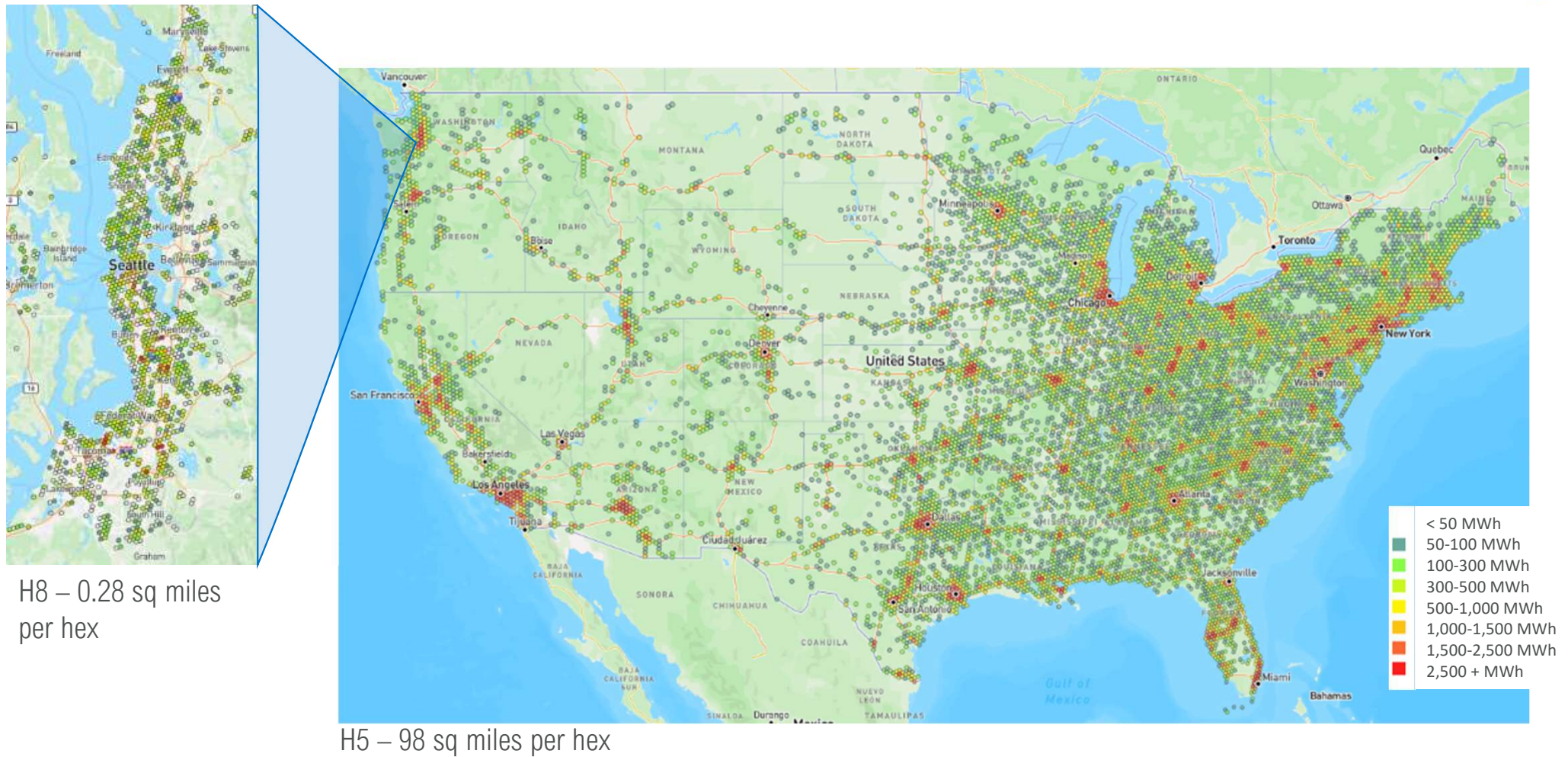
DATA



Other:

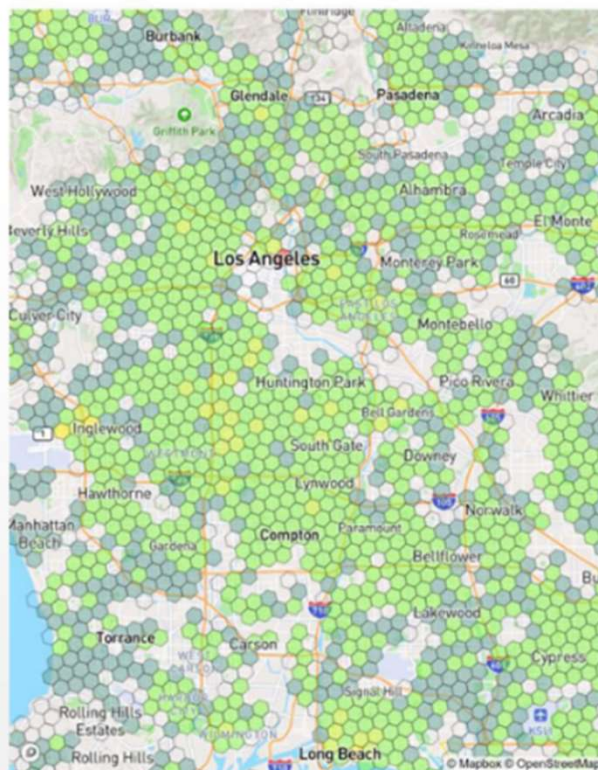
WORLD
RESOURCES
INSTITUTE

LD + MDHD | 100% Electrified

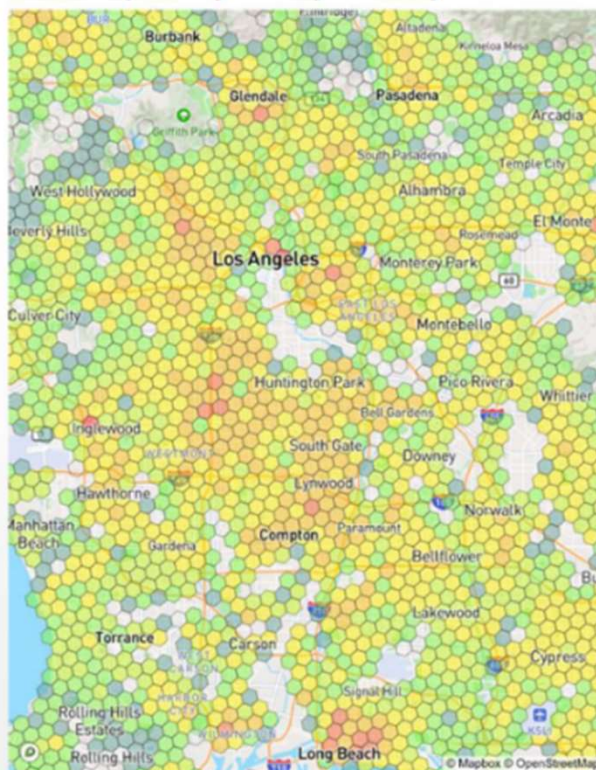


Light-Duty Residential Charging Energy Required Over Time

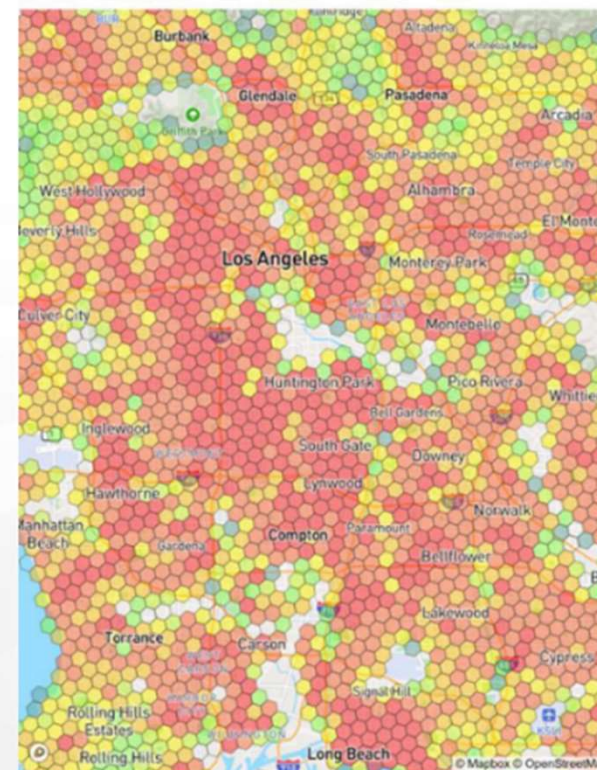
2023



2030 (Policy Compliance)



100% Electrified



Legend (MWh/day)

< 1 MWh

1-3 MWh

3-5 MWh

5-10 MWh

10-15 MWh

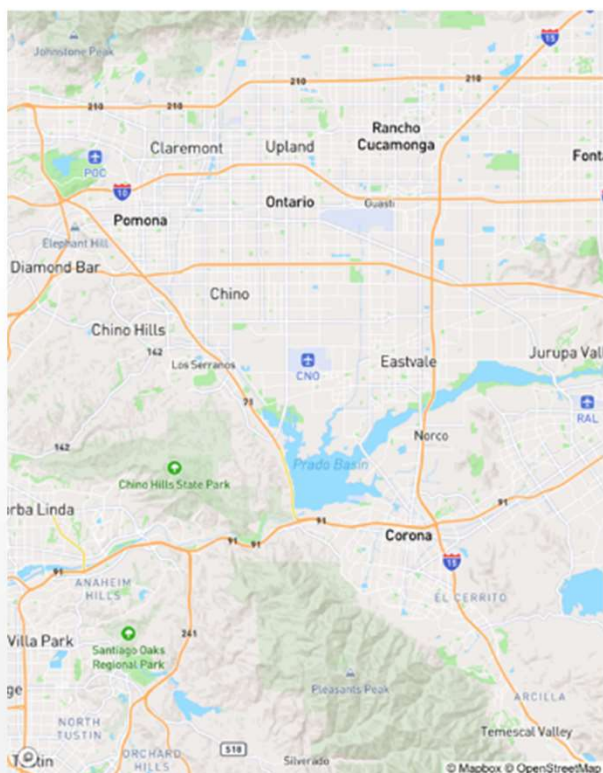
15-25 MWh

25 MWh +

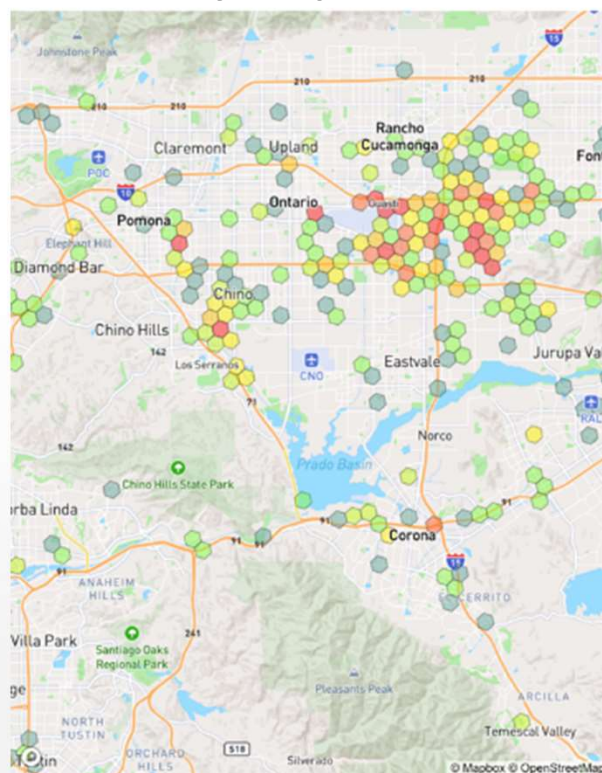
Medium and Heavy-Duty

Return to Depot Charging Energy Required Over Time

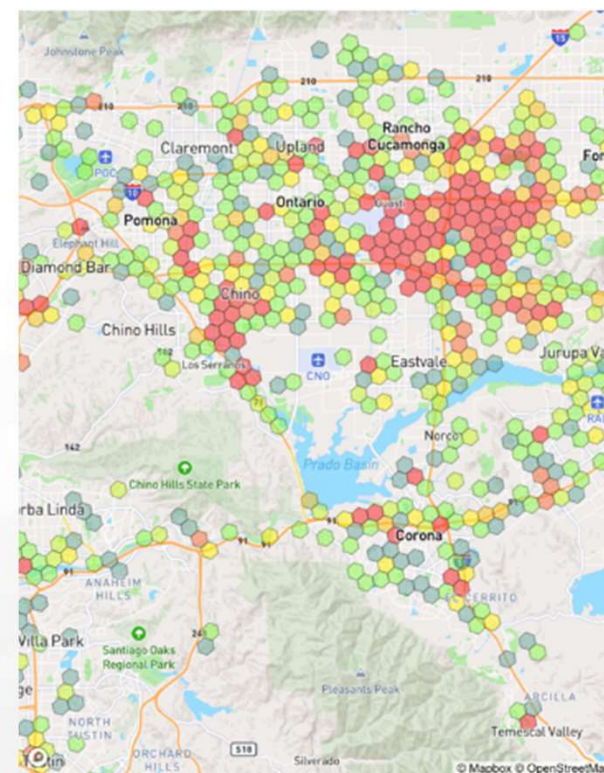
2023



2030 (Policy Compliance)



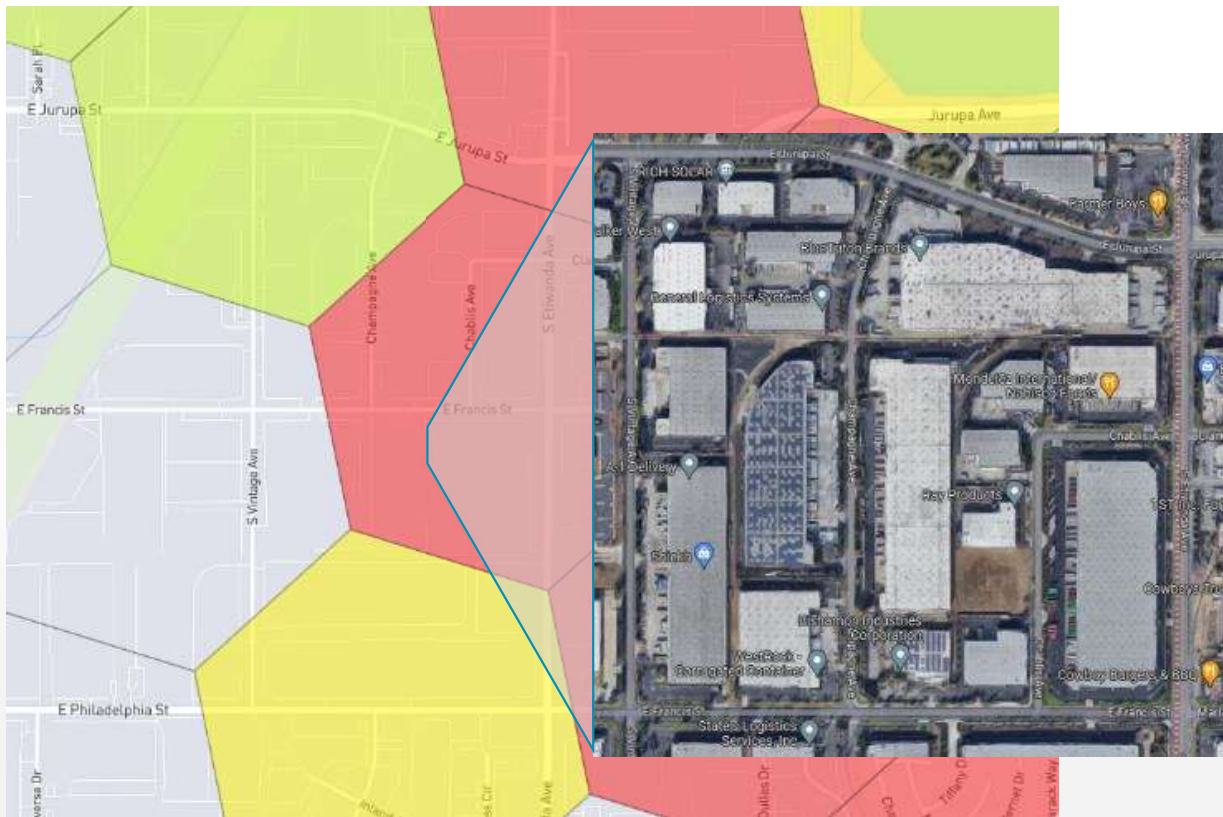
100% Electrified



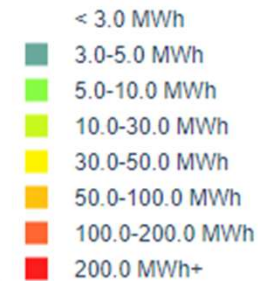
Legend (MWh/day)

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



MWh/Day per Hex

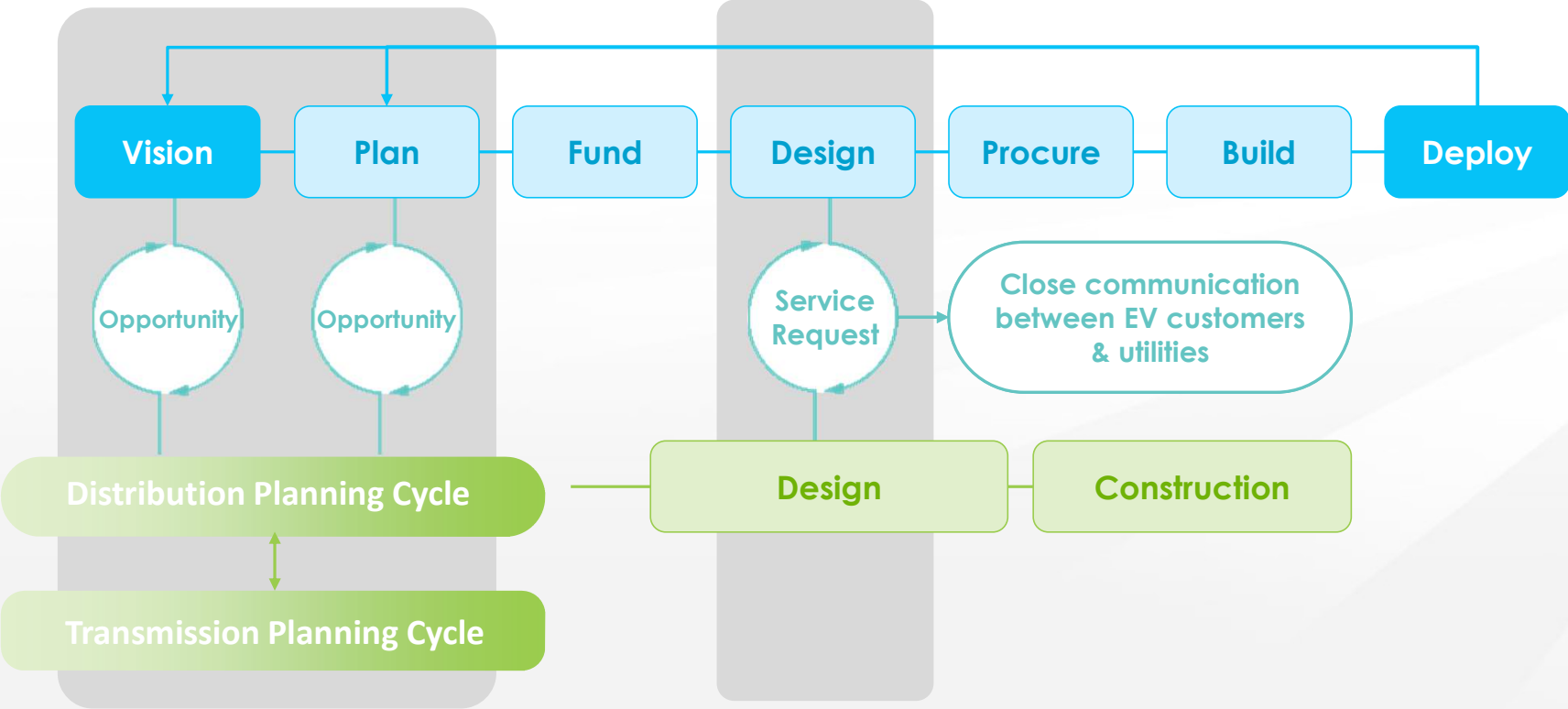


Companies:

- 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



How might we help EV customers and utilities get actionable information, earlier in this process?



GridFAST

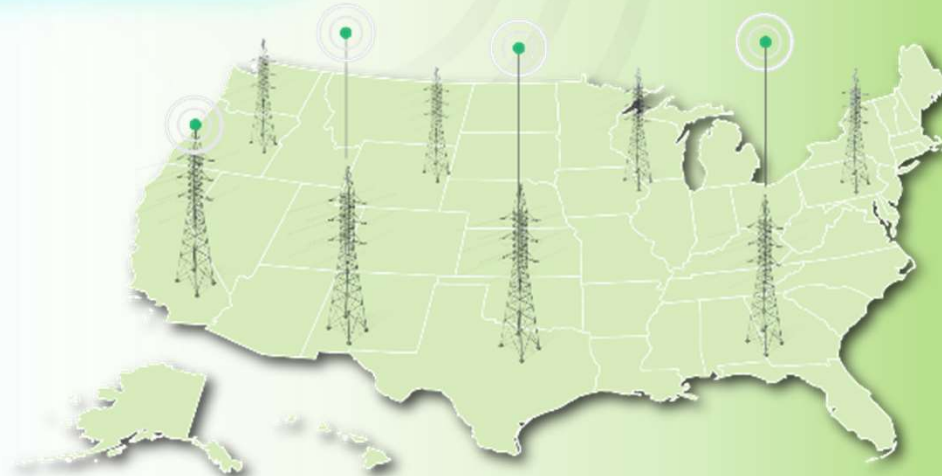
Improve transparency in EV charging planning to inform grid investments and accelerate grid interconnects

2023-2035 plans defining loads,
locations, timing



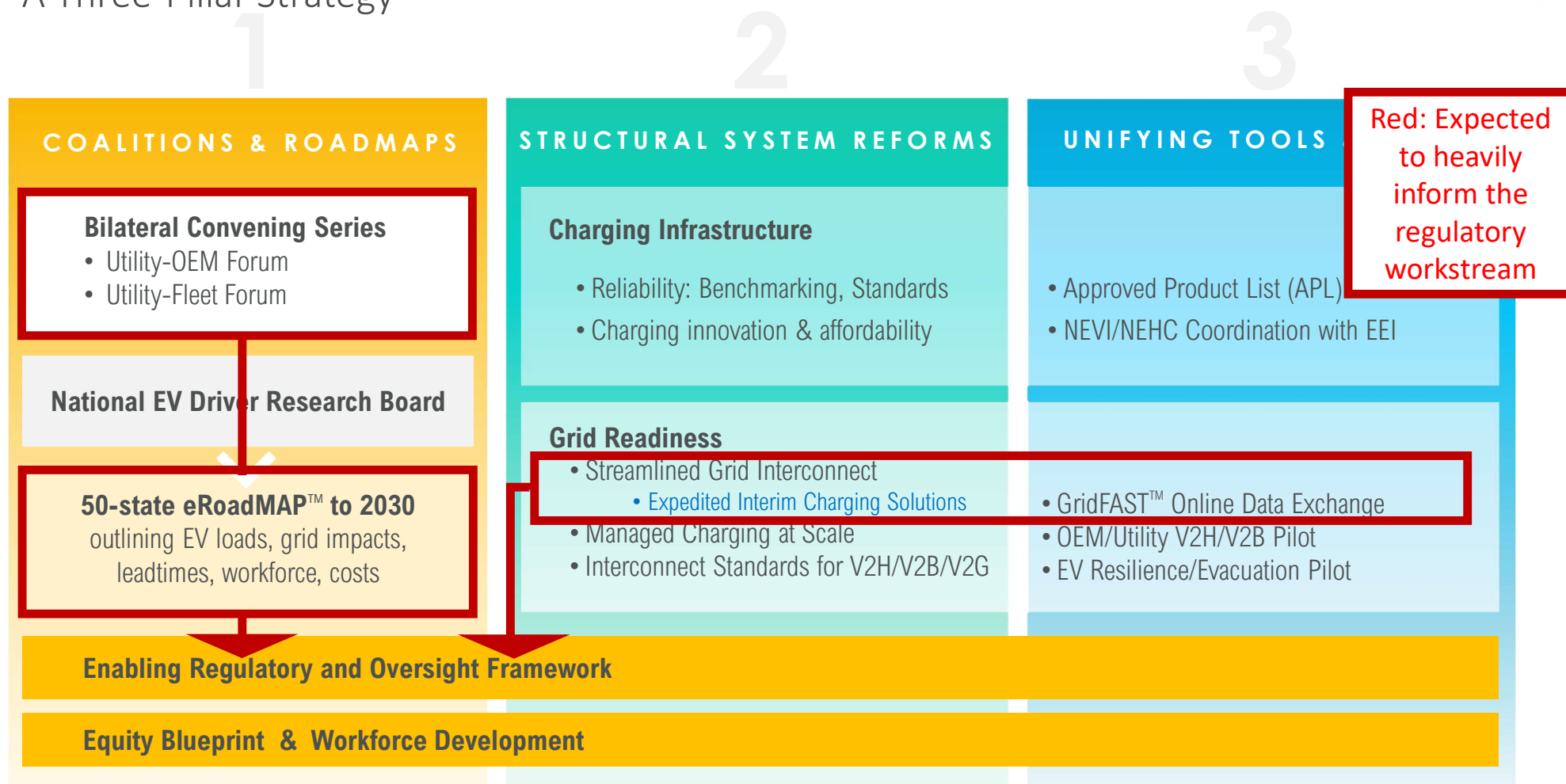
GridFAST
Secure online data
exchange platform

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

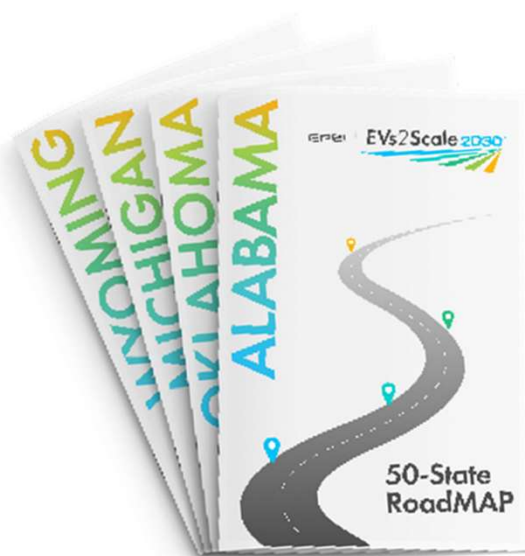


Addressing the Barriers to Achieving EVs at Scale

A Three-Pillar Strategy



Regulatory/Policy Outreach



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

BY STATE:

- + **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)

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

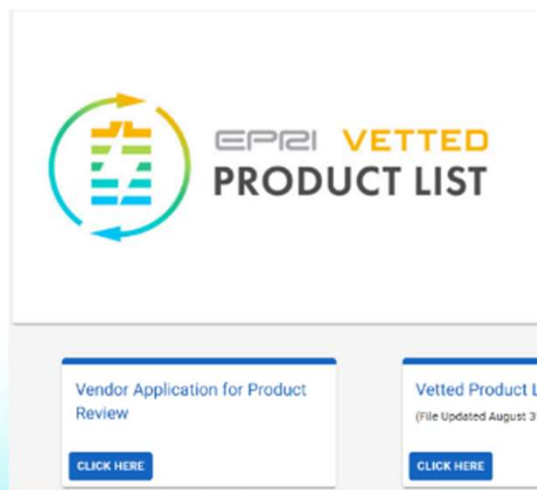
EVs2Scale Website



[EVs2Scale2030 | EPRI](https://msites.epri.com/evs2scale2030) --
<https://msites.epri.com/evs2scale2030>

2

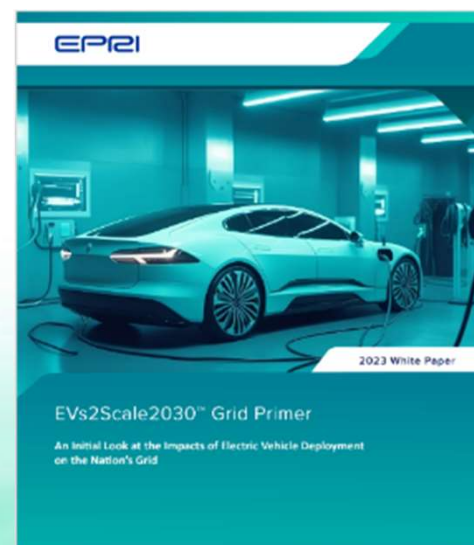
VPL (Vetted Product List)



<https://www.epri.com/vpl>

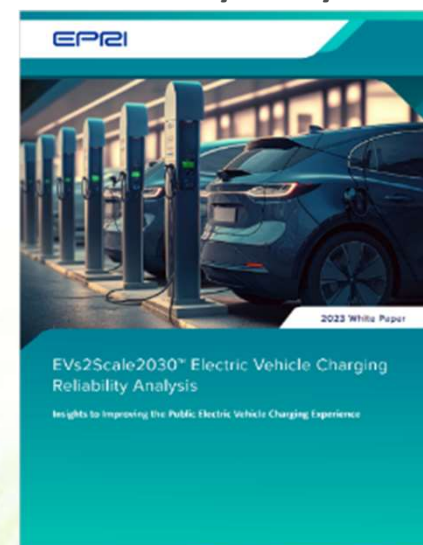
3

Grid Primer



4

EV Charging Reliability Analysis



Mark your calendars:

EPRI's "Electrification 2024" Conference in Savannah, GA 12-14 March, 2024

EVs2Scale²⁰³⁰



Thank You

Distribution System Investments to Enable Medium- and Heavy-Duty Vehicle Electrification

October 24th, 2023

Pamela MacDougall, PhD
Director, Grid Modernization Strategy

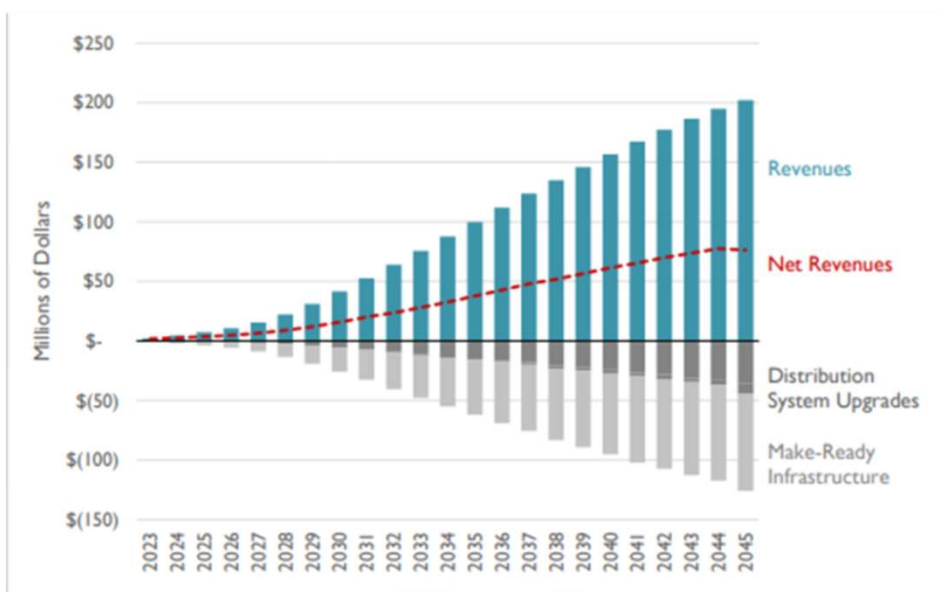
Covering Distribution Costs Without Increasing Rates

- 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

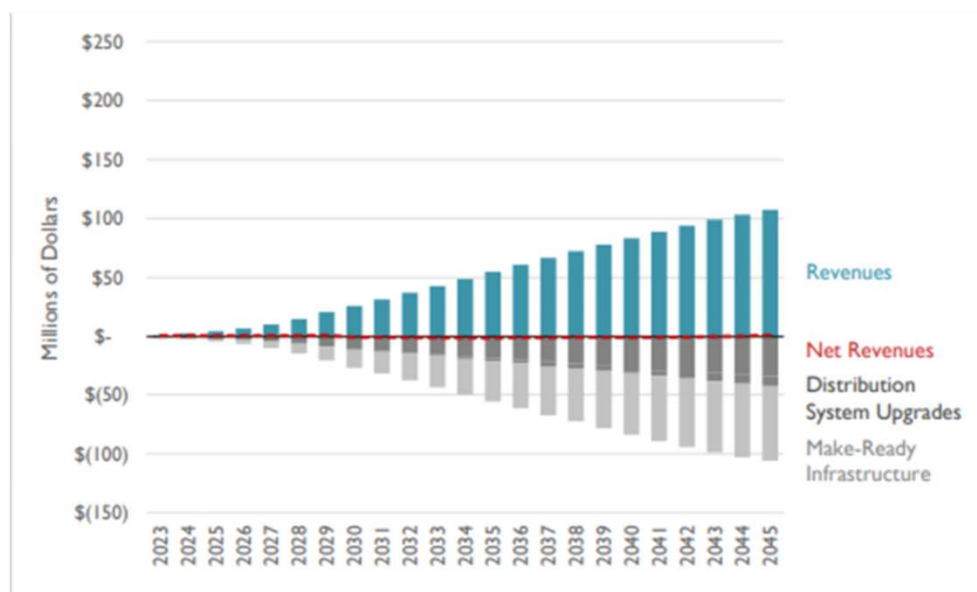
Covering Distribution Costs Without Increasing Rates

- 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)

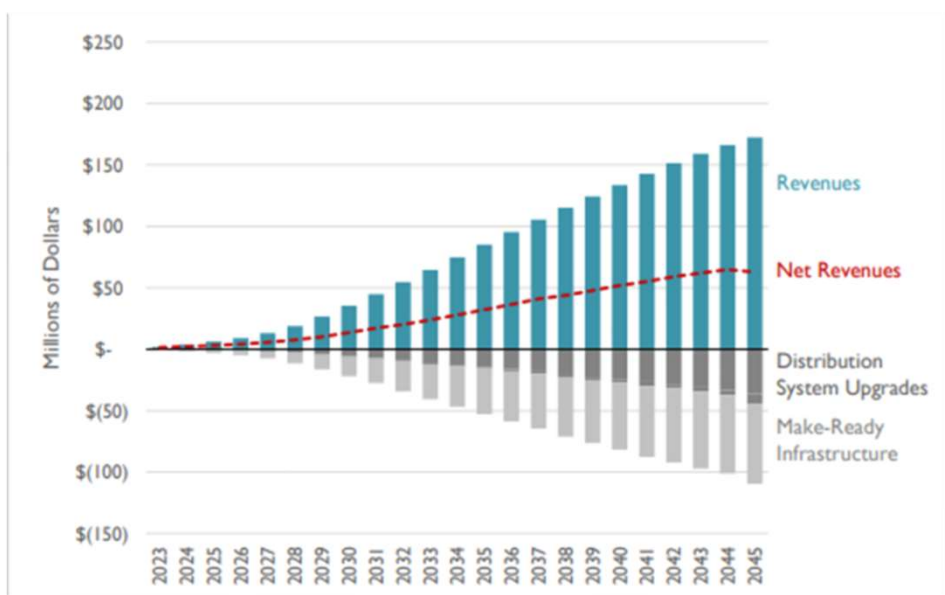


Con Edison Net Revenues
~ \$820 million

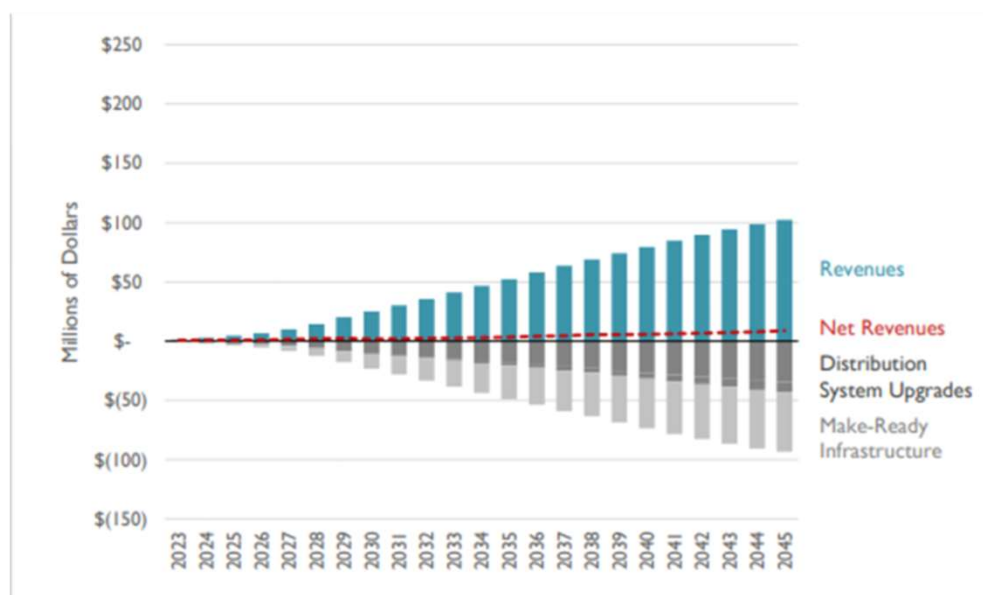


National Grid Net Revenues
~ \$320 thousand

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

Jacqueline Piero

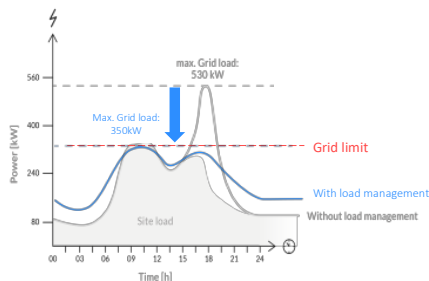
October 24, 2023



The Most Experienced Fleet Charging Company Worldwide

Smart Charging

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



Trusted by 1200+ EV Fleets



Vehicle-Grid Integration

EV Aggregation Platform for monetization of EV battery flexibility & energy markets.



10+ Value generating energy & grid services enabled



Stationary Storage

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



100+ MW Capacity installed or in construction

Consulting & Solutions

Professional services from charging expert Consulting to complete Turnkey Solutions.



180+ Fleets Helped



Customers, Partners & Investors Include

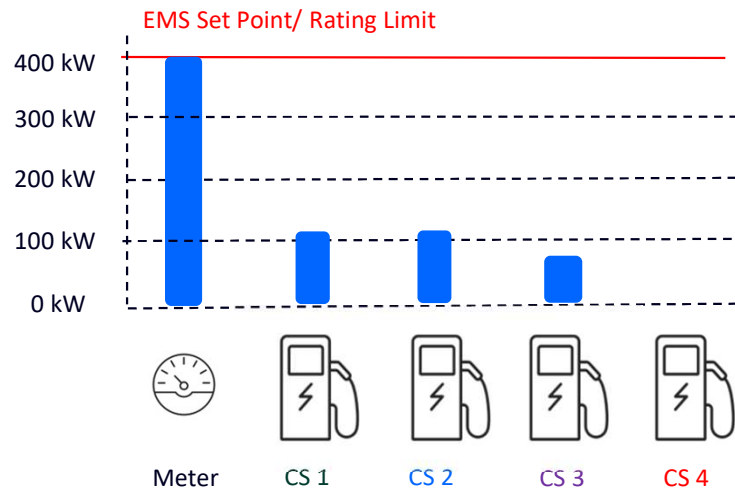
DAIMLER



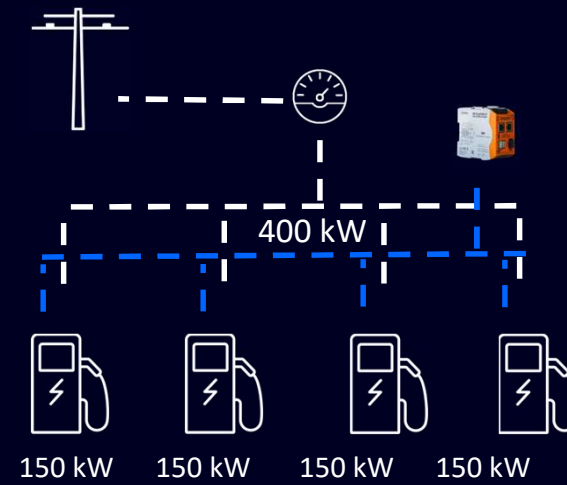
AlphaStruxure



ALM sets a safe limit on total site usage



While allowing EVSEs their full charging capacity



- 4 - 150 kW Chargers
- 500 kW transformer

4 * 150 kW = 600 kW of Load
Transformer Rated to 80% = 400 kW of space



Transit: Enabling electrification now*

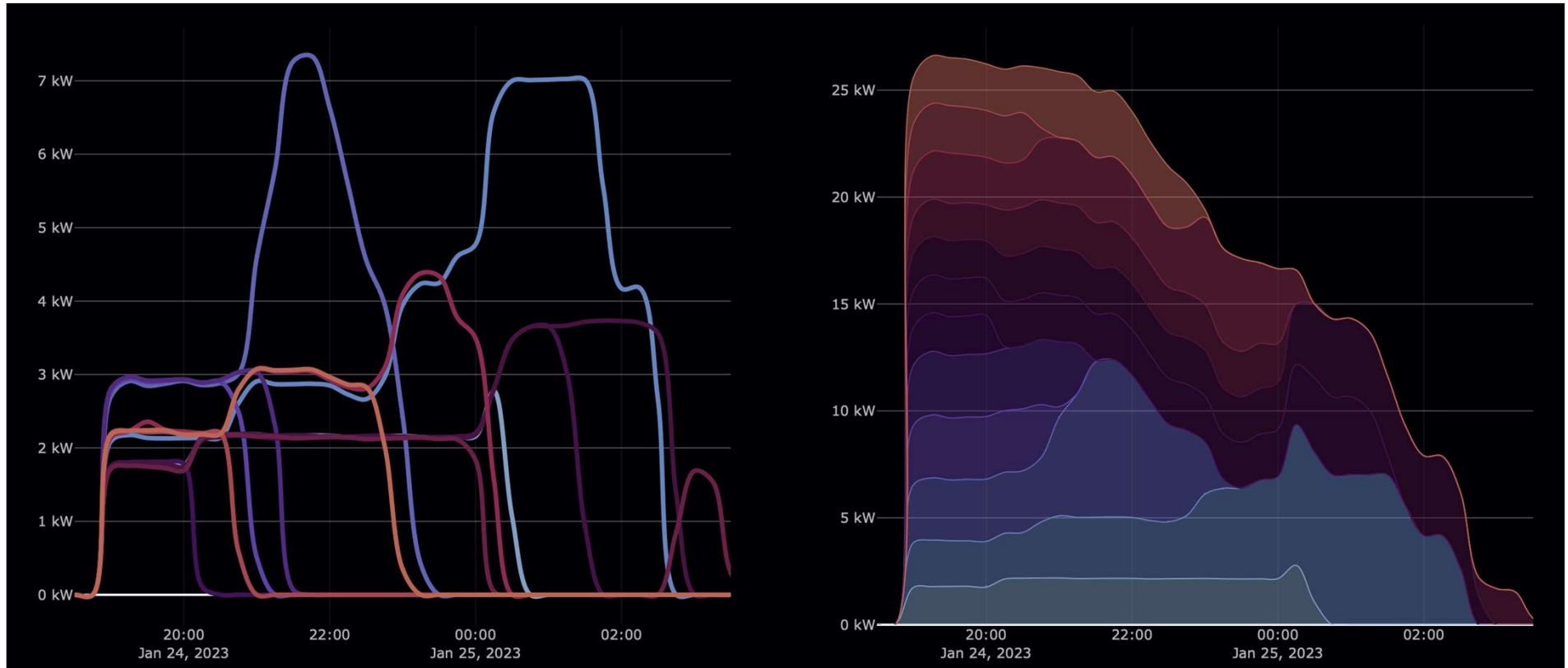
- > **LOCATION:** California
- > **TOTAL CONTROLLED POWER:** 1.8 MW
- > **EV-DEDICATED CONNECTION LIMIT:** 1.4 MW
- > **CHARGING STATIONS:** 10 x 180 kW dual port DC

- > **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:** 1.8MW
- > **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

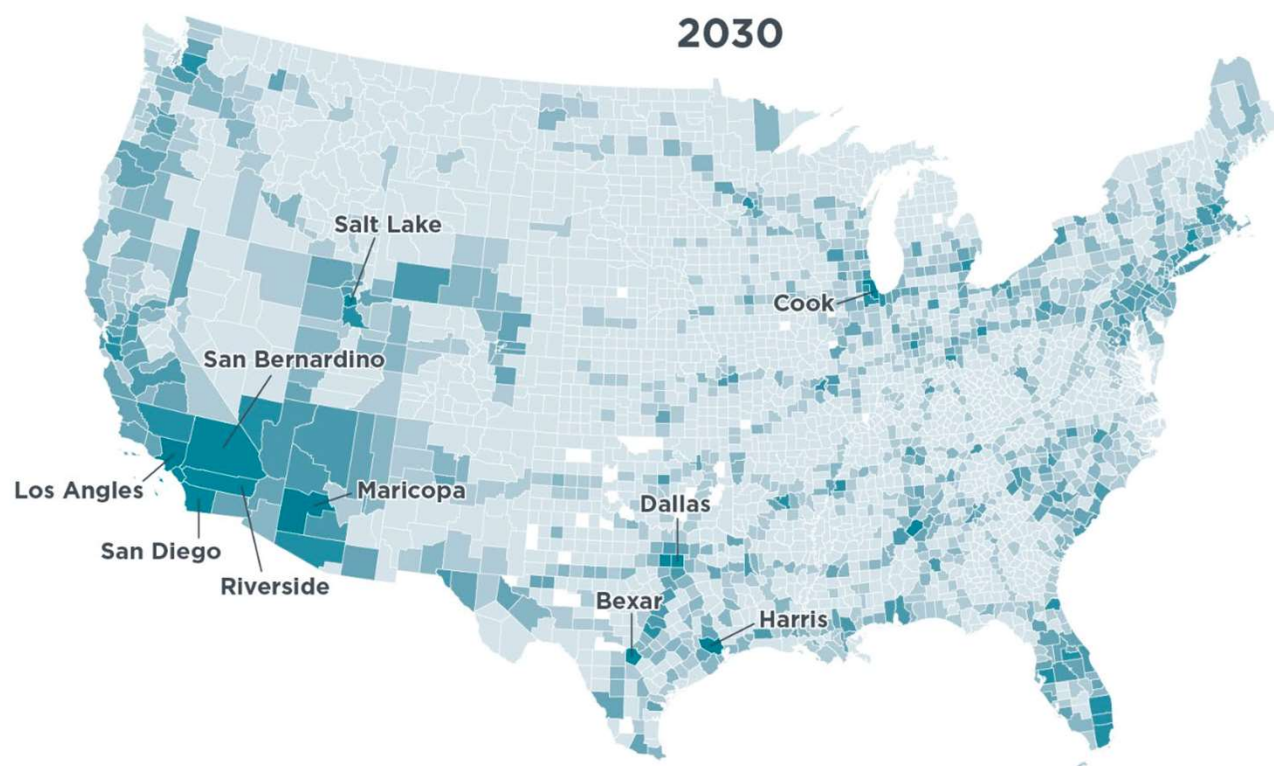
EVSE nameplate: 88.32 kW

© The Mobility House

MD/HD fleets will impact the grid first

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%

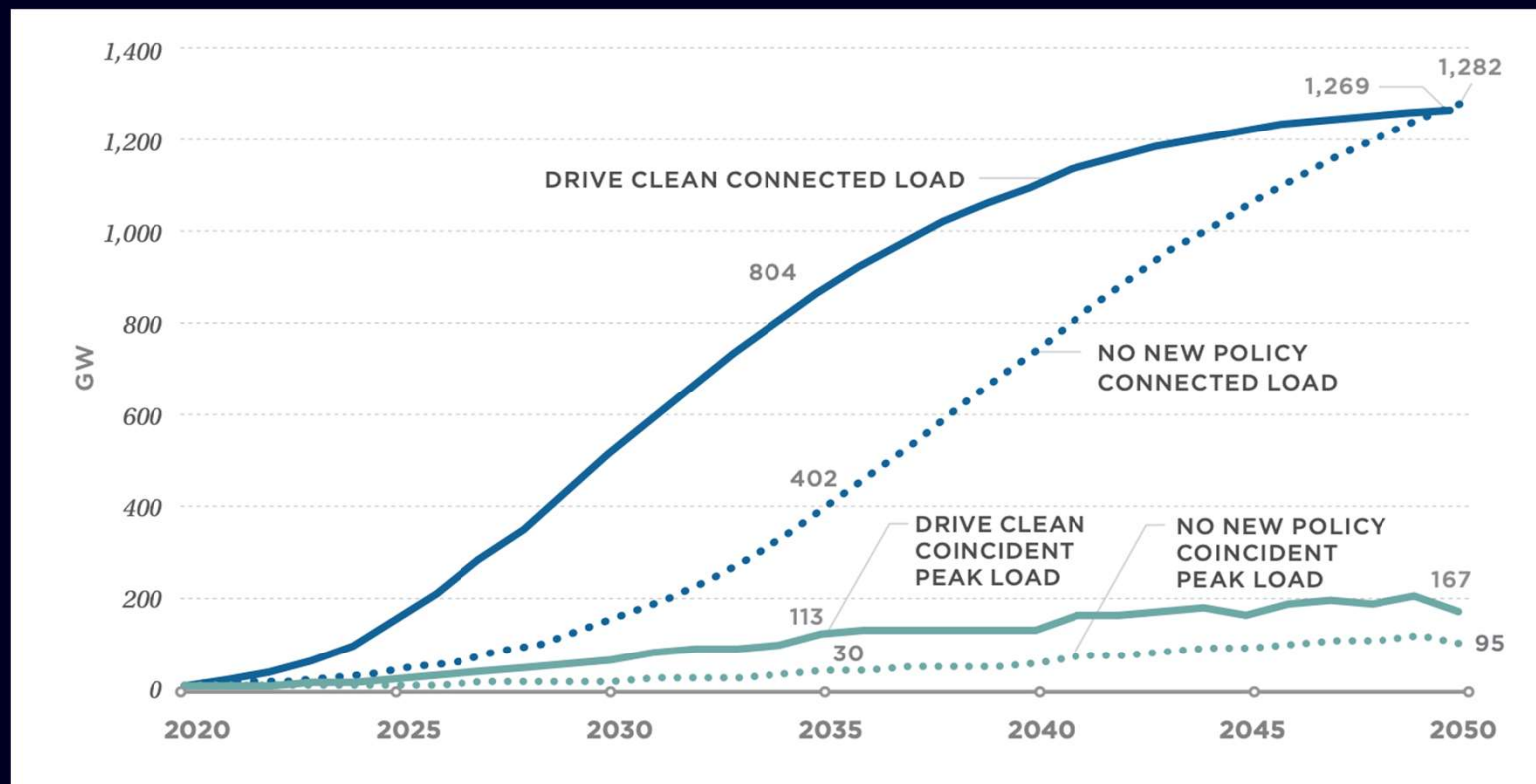


MD/HD forecast peak charging load by county
(International Council on Clean Transportation, May 2023)

*CA, OR, WA, MA, VT, NY, NJ, CO

© The Mobility House

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

	Static site limit	Dynamic Hosting Capacity
Method	<ul style="list-style-type: none"> Consistent, hard limit on aggregate kW usage 	<ul style="list-style-type: none"> Contractual agreement to temporarily curtail aggregate usage during predetermined periods
Intended impact	<ul style="list-style-type: none"> Site connection: panel and internal overcurrent protections 	<ul style="list-style-type: none"> Feeder/transformers/substation
Duration	<ul style="list-style-type: none"> Life of site Until electrified fleet increases 	<ul style="list-style-type: none"> Life of site Until primary distribution infra is upgraded
Communication	<ul style="list-style-type: none"> No external signal 	<ul style="list-style-type: none"> Notification and trigger likely similar to DR Text/Email Via smart meter API DERMS comms
Utility involvement	<ul style="list-style-type: none"> Utility involvement is always the best practice! AHJ approval necessary 	<ul style="list-style-type: none"> Utility coordination is essential
Planning impact	<ul style="list-style-type: none"> Short term/upon energization request 	<ul style="list-style-type: none"> Medium- to long-term infra planning & investment
Value	<ul style="list-style-type: none"> Single customer time to energization \$ 	<ul style="list-style-type: none"> Multiple customers' ability to energize at all \$\$\$



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
- Jacqueline Piero, US Head of Policy & Regulatory, The Mobility Project.

Peer Sharing

- **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?**

All working group members are invited to share about their state



The next EVSWG
meeting will be
November 28,
3:00-4:30 pm ET

[HTTPS://WWW.NARUC.ORG/CPI-1/ENERGY-CUSTOMERS/ELECTRIC-VEHICLES/](https://www.naruc.org/cpi-1/energy-customers/electric-vehicles/)

Announcements

The NARUC EV Getting Started Guide is now live!



NARUC

National Association of Regulatory Utility Commissioners

Getting Started Guide for Electric Vehicles



Overview

NARUC members are increasingly seeking more information about electric vehicle (EV) infrastructure needs, impacts, and the role of Public Utility Commissions (PUCs). This Getting Started Guide connects commissioners and staff to essential EV resources that the NARUC Center for Partnerships and Innovation (CPI) has developed. All of these resources can be found on the [NARUC CPI EV webpage](#).

NARUC CPI hosts an Electric Vehicles State Working Group (EV SWG), which is open to all NARUC members and holds monthly meetings on utility regulatory topics related to transportation electrification. For more information, or to join the working group, please contact Robert Bennett, rbennett@naruc.org, or Danielle Sass Byrnett, dbyrnett@naruc.org.

Foundational NARUC publications on EVs and the Role of PUCs

- [Mini Guide on Transportation Electrification: State-Level Roles and Collaboration among Public Utility Commissions, State Energy Offices, and Departments of Transportation](#), Summer 2022

This mini guide describes the unique and vital roles State Energy Offices, Public Utility Commissions (PUCs), and Departments of Transportation (DOTs), as well as State Environmental Agencies, Consumer Advocates, and other important state-level partners play in transportation electrification.

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
- ▶ **Presentations and recordings of past EVSWG events** are available on the NARUC website: 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](#)
 - [Electric Vehicle Interoperability: Considerations for Public Utility Regulators](#)
 - [Considering Interoperability for Electric Vehicle Charging: A Commission Case Study](#)
 - [Transportation Electrification: State Level Roles and Collaboration among Public Utility Commissions, State Energy Offices, and Departments of Transportation](#)