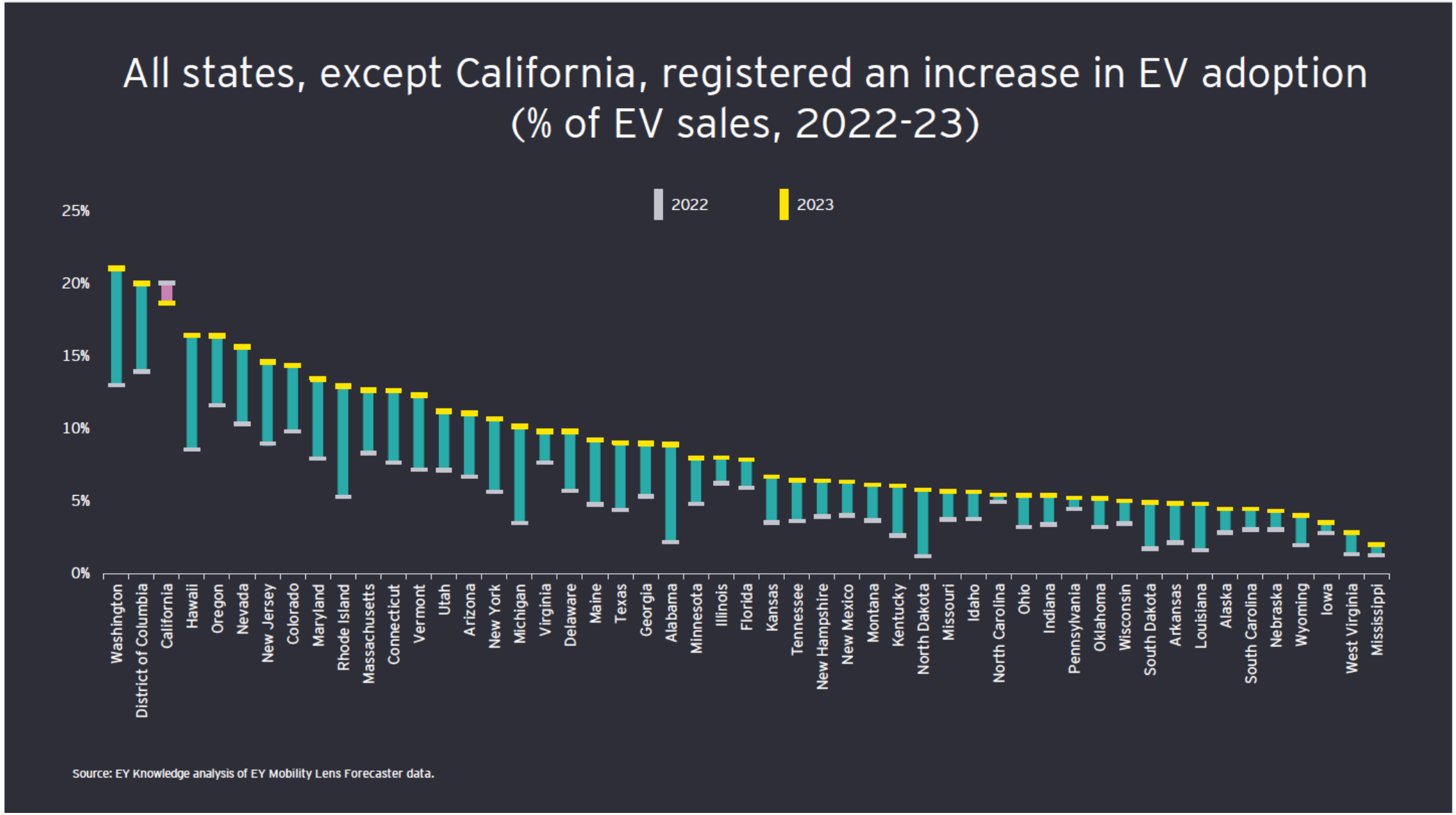
EVs2Scale™ 2030

NASUCA

12 November 2024

Britta K. Gross
Director, Transportation

EV Sales Update (LDV)



The Utility Industry Challenge

- Government, Industry, and Leading Fleets are **aligned on aggressive 2030 vehicle electrification goals**
- The **pace of needed year-over-year action and investment to prepare the grid is not clear**
- Utilities (and regulators) **must have confidence in when and where loads** are coming

Collaboration + Partnerships

Ongoing Engagement

EVs2Scale 2030

UTILITY INDUSTRY

EPRI
LPPC Large Public Power Council
EEI
NRECA America's Electric Cooperatives
American Public Power Association
Alliance for Transportation Electrification
NASUCA National Association of State Utility Consumer Advocates
NARUC National Association of Regulatory Utility Commissioners

AUTO & TRUCKING INDUSTRY

Ford
Tesla
BMW
Audi
Toyota
Mercedes-Benz
Volvo
PACCAR
GM
Rivian
Daimler
Honda
Alliance for Automotive Innovation
Volkswagen
NACFE
NADA

FLEET OPERATORS

amazon
FedEx Federal Express
Enterprise
US Foods
Uber
DHL
Walmart Save money. Live better.
Lyft
Pitt Ohio Supply Chain • Ground • LTL • TL
Penske
J.B. Hunt
element
NAFA Fleet Management Association
WHEELS Together Let's Go Far

CHARGING PROVIDERS AND FUELING RETAILERS

Circle K
electrify america
flo EV Charging
chargepoint
EVgo FAST CHARGING
bp
Shell

NGO & STANDARD-SETTING ORGANIZATIONS

NRDC
EDF Environmental Defense Fund
MARMI
CHARIN
SAE International
ATLAS Public Policy
Plug In America
Electric Vehicle Association

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™

PROJECT PARTNERS

BROAD INDUSTRY SUPPORT

amazon

Ameren

AUSTIN ENERGY®

CATERPILLAR

CenterPoint Energy

conEdison

Consumers Energy
Count on Us

DUKE ENERGY®

exelon℠

FirstEnergy

GREAT RIVER ENERGY

JEA
Building Community®

nationalgrid

New York Power Authority

Your Energy Partner
OPPD
Omaha Public Power District

PGE

PG&E®

Seattle City Light

SOUTHERN CALIFORNIA EDISON®

Southern Company

SMUD®

SRP

Xcel Energy®

EVs2Scale2030 Advisory Board

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

Ameren, Mark Fronmuller

ComEd, Gil Quiniones

GRE, Jeff Haase

LCRA, Khalil Shalabi

SMUD, Rachel Huang (LPPC)

Southern Company, Chris Cummiskey

Xcel Energy, Emmett Romine

APPA, Paul Zummo

EEI, Kellen Schefter

NRECA, Angela Strickland

NARUC, Katherine Peretick (Michigan PSC)

AAI, John Bozzella

Amazon, Sujit Mandal

Caterpillar, Rob Schueffner

Daimler Truck, Diego Quevedo

ATE, Phil Jones

JOET, Rachael Nealer

Addressing the Barriers to Achieving EVs at Scale

A Three-Pillar Strategy to Address the Key Industry Gaps

EVs2Scale 2030

1 COALITIONS & ROADMAPS

Industry Forum Convenings
- 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

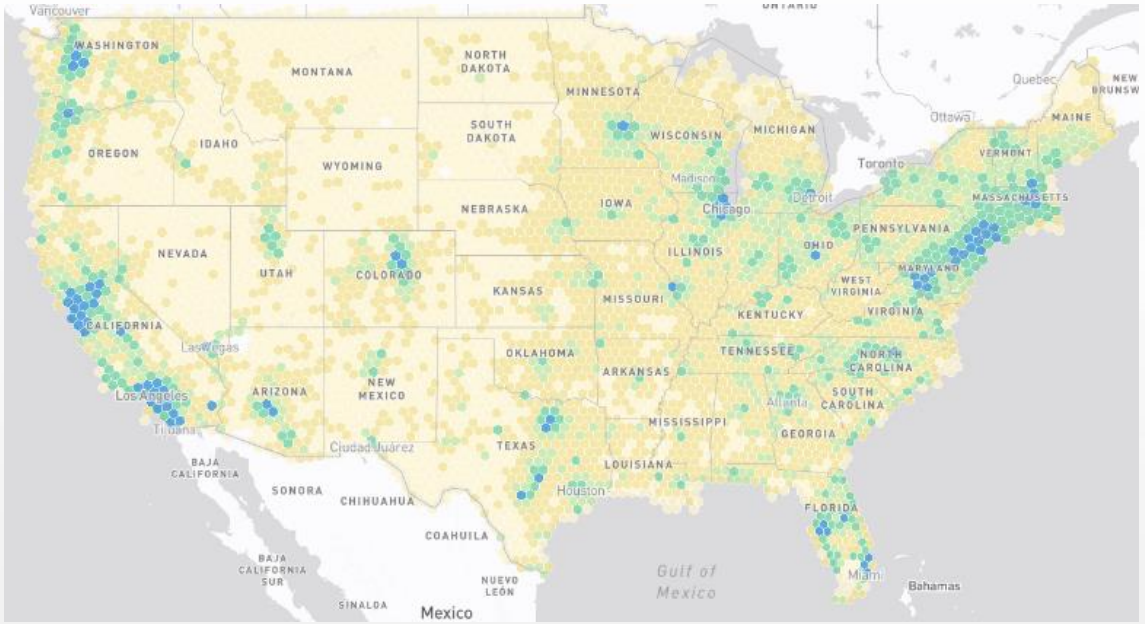
Confidence requires creating Public and Private Transparency in Planning

EVs2Scale 2030

eRoadMAP

Public Tool

Visualization and Communication (Hex8)

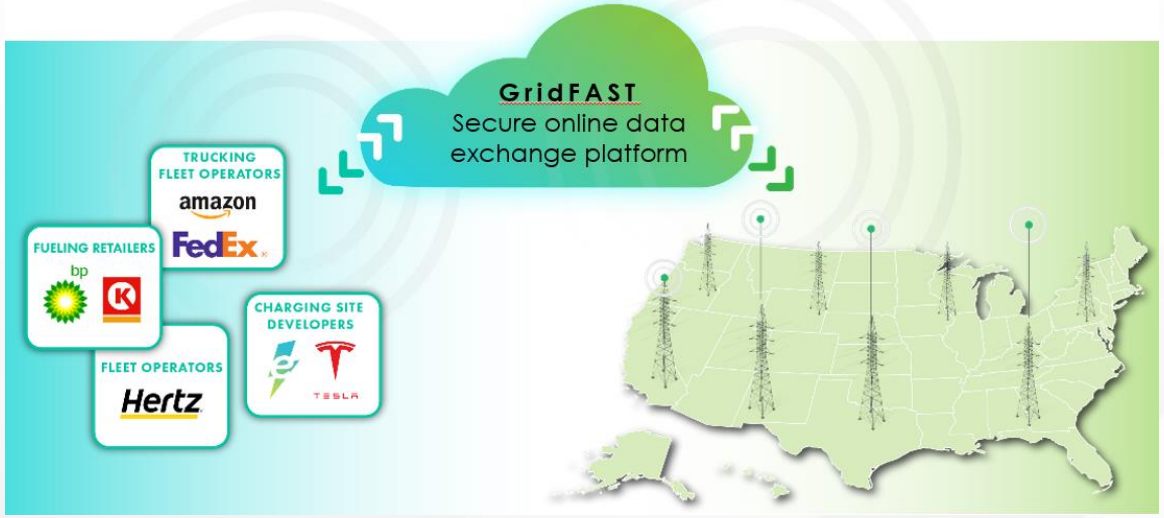


https://eroadmap.epri.com/

GridFAST

Industry Platform

Planning and Accelerating Grid Interconnects (site level)



Launch in 2025

EPRI

Confidence in load forecasting (that supports decision-making now) **required a new approach**

- **Go directly to the most certain sources of load information – those with actual plans**
  - **DMV registration data** – helpful, but doesn't accurately represent some vehicle segments
  - **Purchased datasets** – helpful, but aren't typically complete (competitive data/telemetry industries)
  - **State, county, or census tract level data** – helpful, but isn't sufficiently granular to support investment decisions

- **eRoadMAP relies on all the above data (and more) to build confidence** and **show** where/when EV load is likely to appear

eRoadMAP | Input Collaborators

EVs2Scale2030

ANALYTICS

EPRI

RMI
ENERGY. TRANSFORMED.

U.S. DEPARTMENT OF ENERGY

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

DATA

amazon

DAIMLER TRUCK

TESLA

NAVISTAR

WORLD RESOURCES INSTITUTE

PACCAR

REPUBLIC SERVICES

Enterprise Mobility™

NADA
NATIONAL AUTOMOBILE DEALERS ASSOCIATION

PITT OHIO
SUPPLY CHAIN • LTL • TL

VOLVO

MANHATTAN
BEER DISTRIBUTORS

Also:

Experian™

GEOTAB ITS

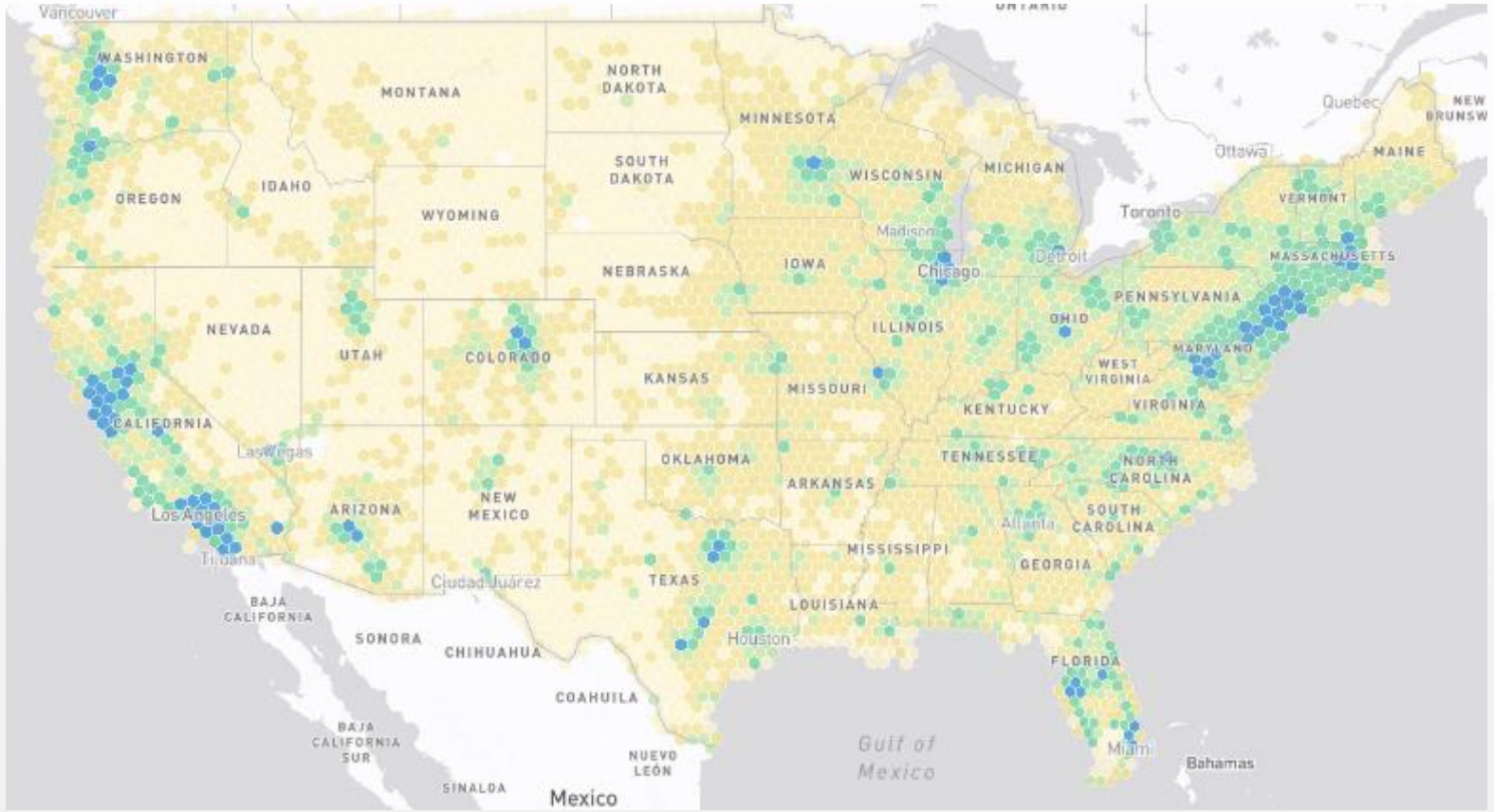
INRIX

REPLICA

eRoadMAP

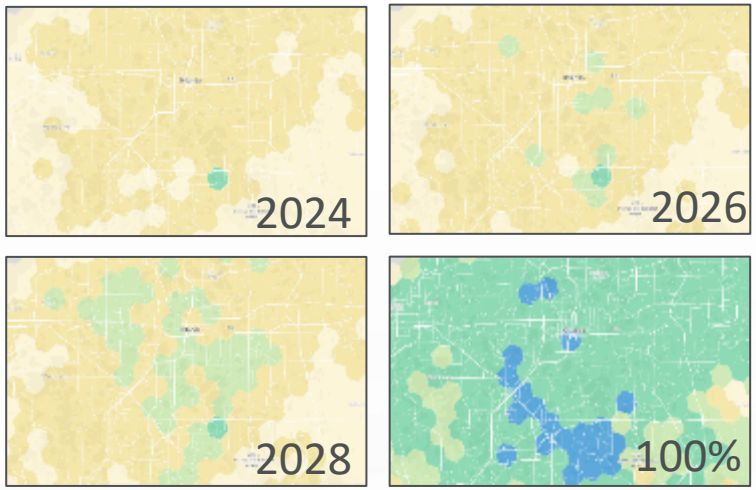
When and where are loads likely to appear on the grid?

https://eroadmap.epri.com/



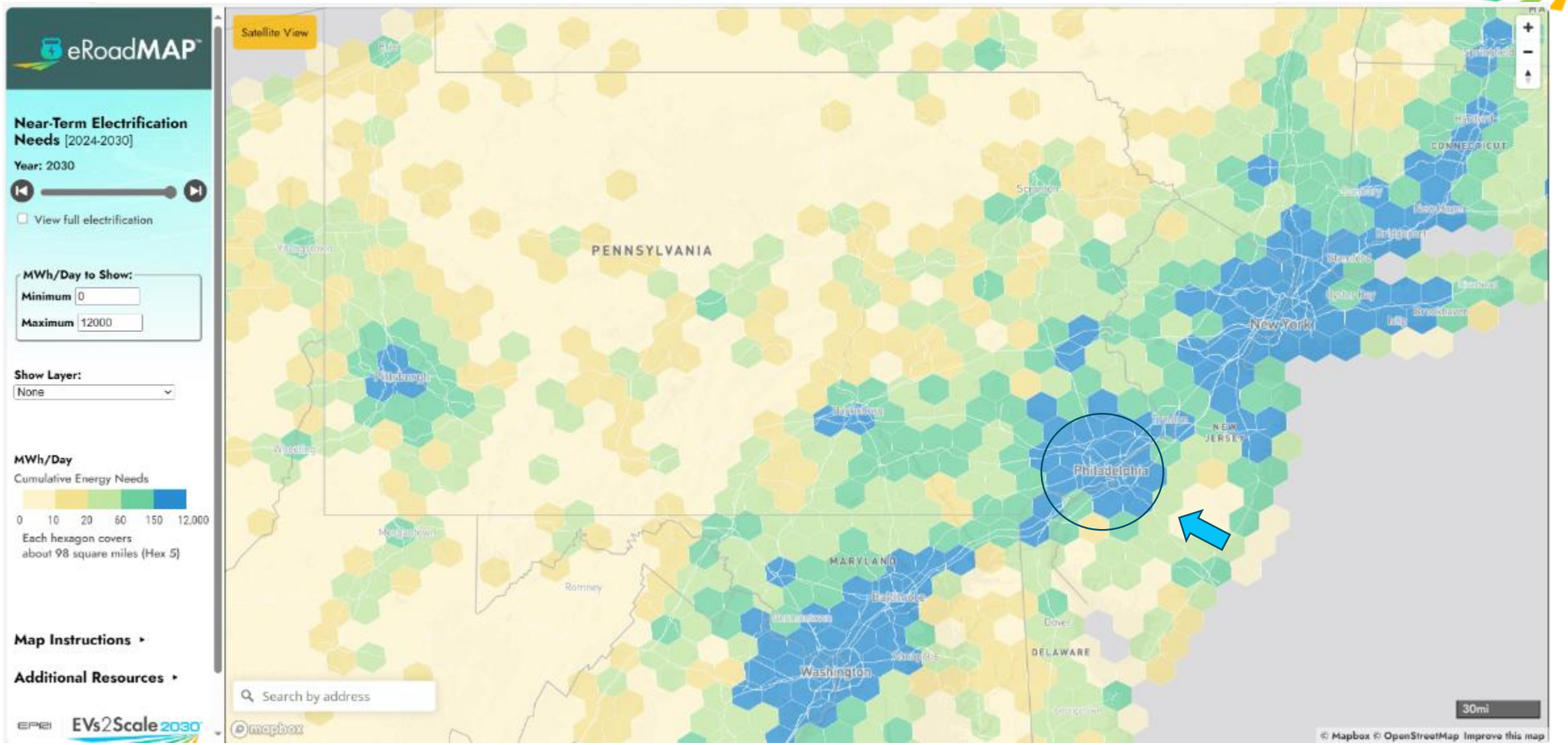
Interactive Load Map to Hex8 Resolution (0.28 mi^2)

Fleet Electrification Over Time



Fleet activity aggregated to Hex8 Level
(protects proprietary fleet data)

Interactive Energy Map: Philadelphia Area (2030)



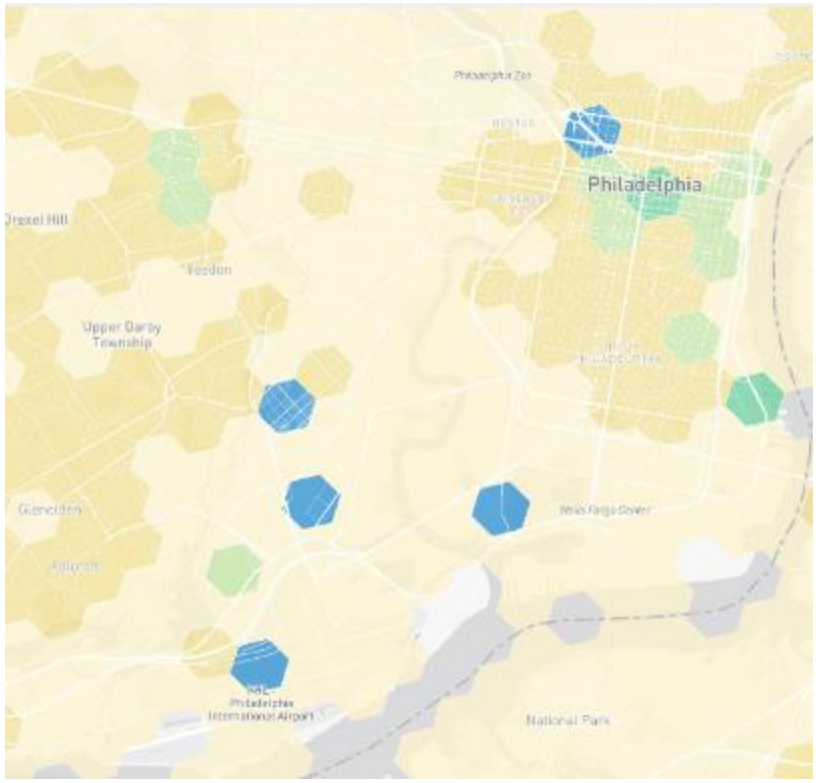
Hex 5 (98 mi^2)

Interactive Energy Map: Philadelphia Area

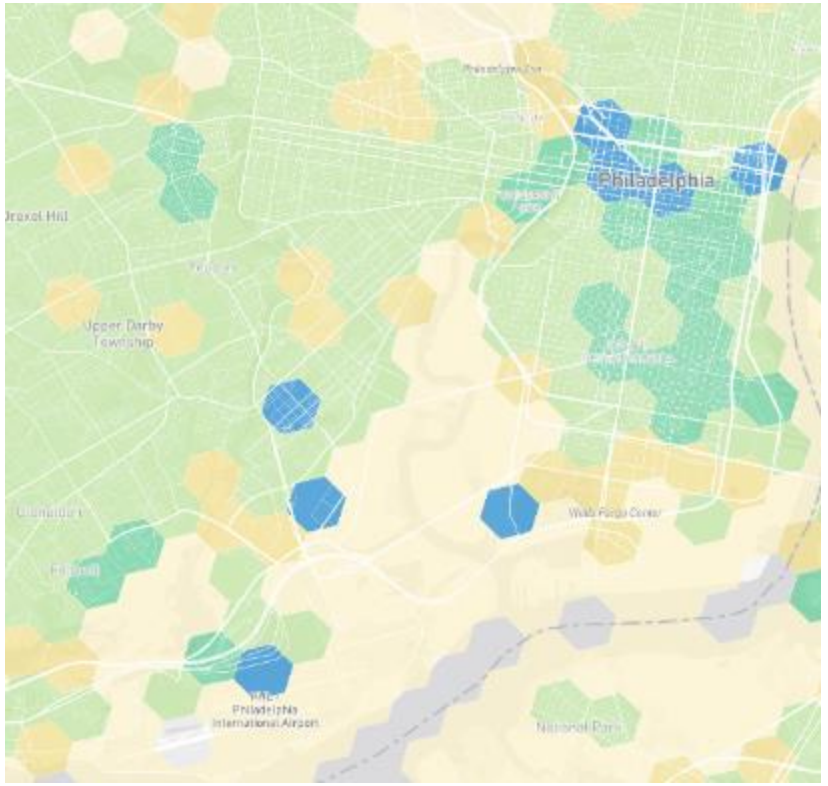
2026 to 2030 to Full Electrification Comparison

EVs2Scale 2030

2026



2030



Full Electrification

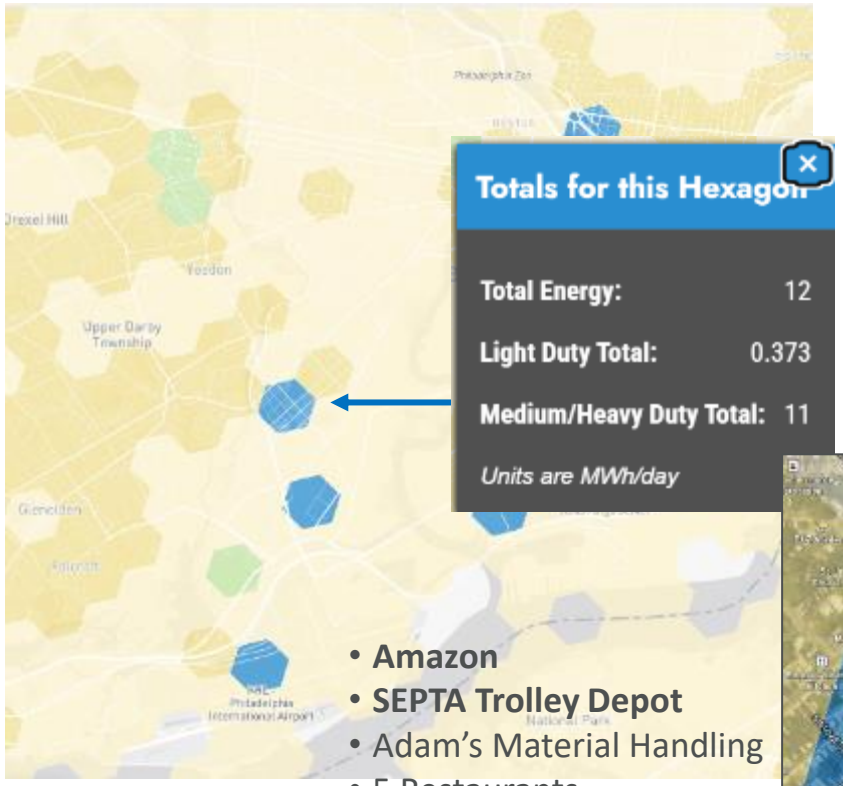
Hex 8 (0.28 mi^2)

Interactive Energy Map: Philadelphia Area

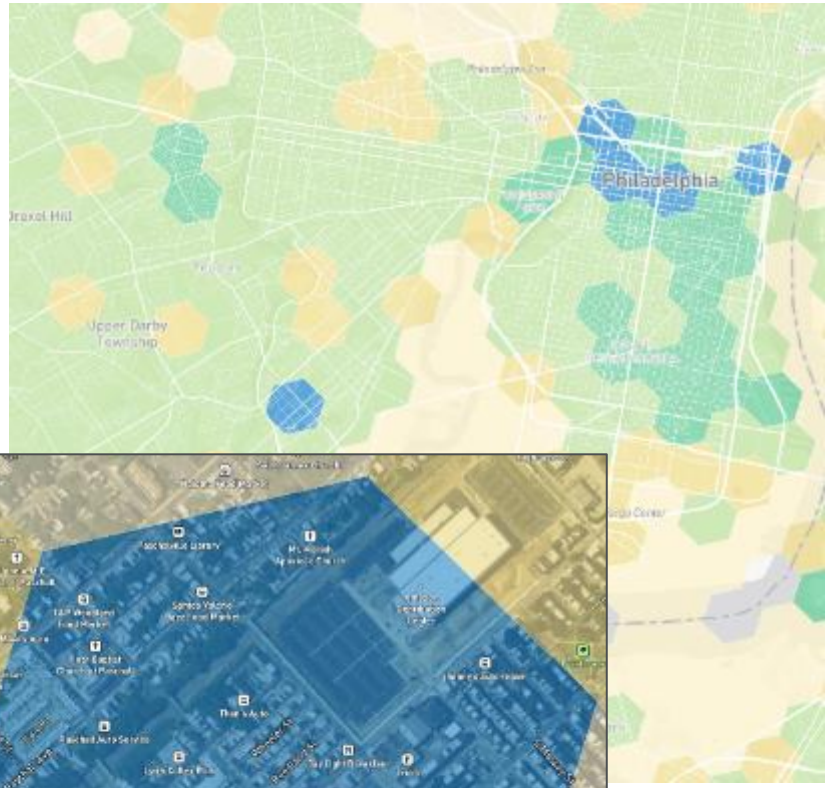
2026 to 2030 to Full Electrification Comparison

EVs2Scale 2030

2026



2030



Full Electrification

- **Amazon**
- **SEPTA Trolley Depot**
- Adam's Material Handling
- 5 Restaurants
- 4 Auto Repair Shops
- 3 Churches
- 3 Food/Drink Markets
- 1 Library

Hex 8 (0.28 mi^2)

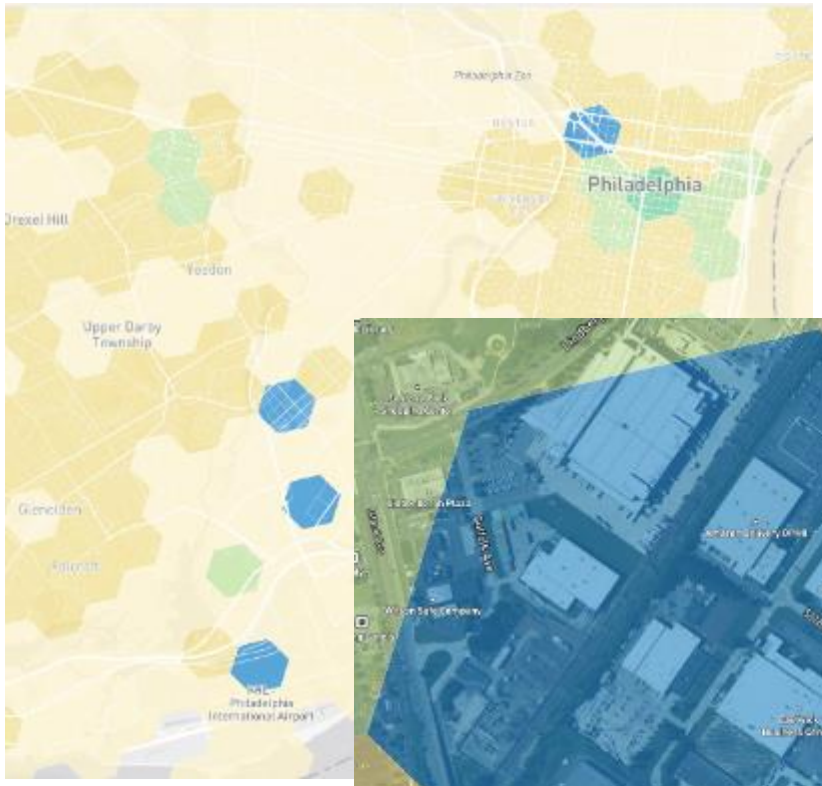
EPRI

Interactive Energy Map: Philadelphia Area

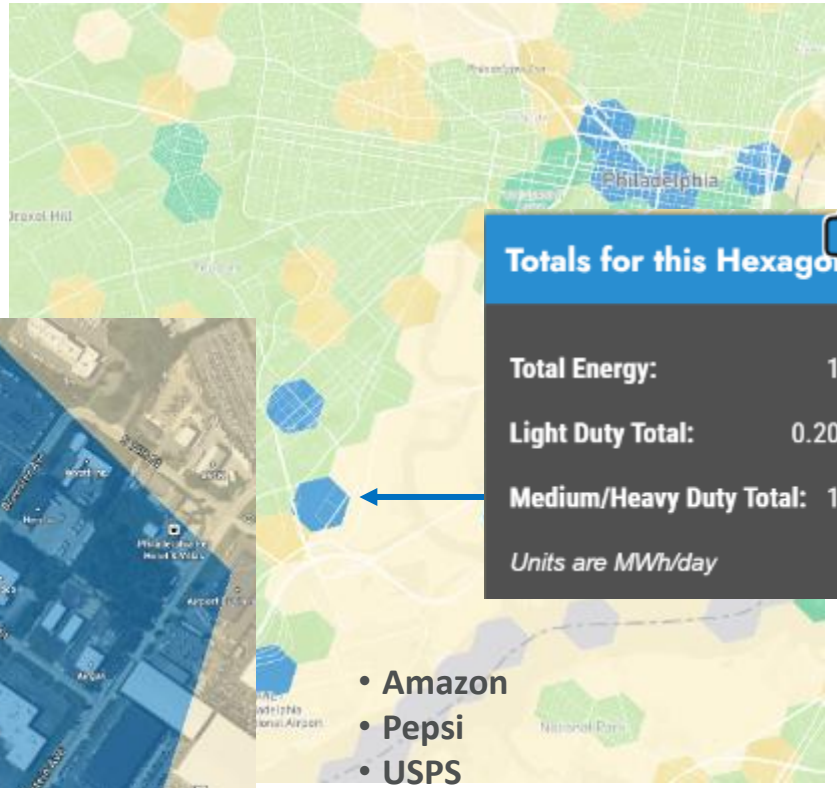
2026 to 2030 to Full Electrification Comparison

EVs2Scale 2030

2026



2030



Full Electrification

- **Amazon**
- **Pepsi**
- **USPS**
- Airgas
- Sixt
- 5 other businesses
- (Enterprise just to the east)

Hex 8 (0.28 mi^2)

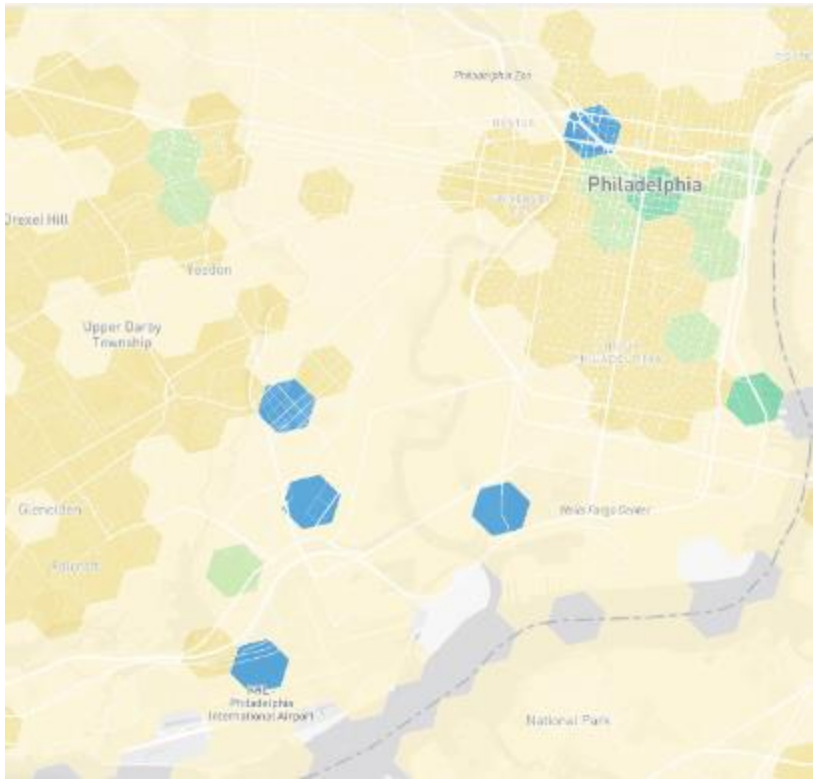
EPRI

Interactive Energy Map: Philadelphia Area

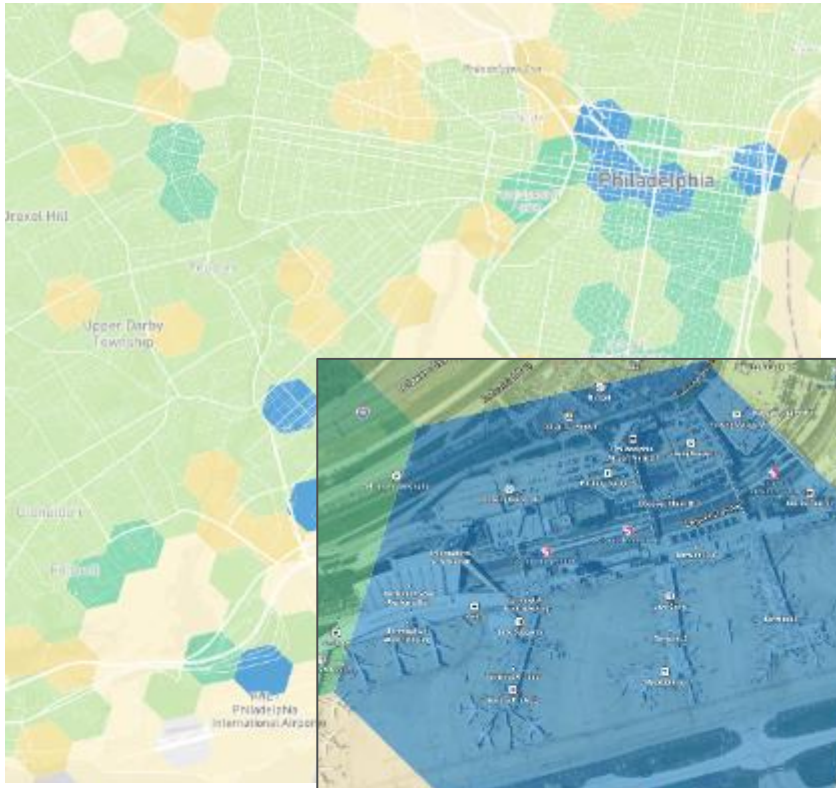
2026 to 2030 to Full Electrification Comparison

EVs2Scale 2030

2026



2030



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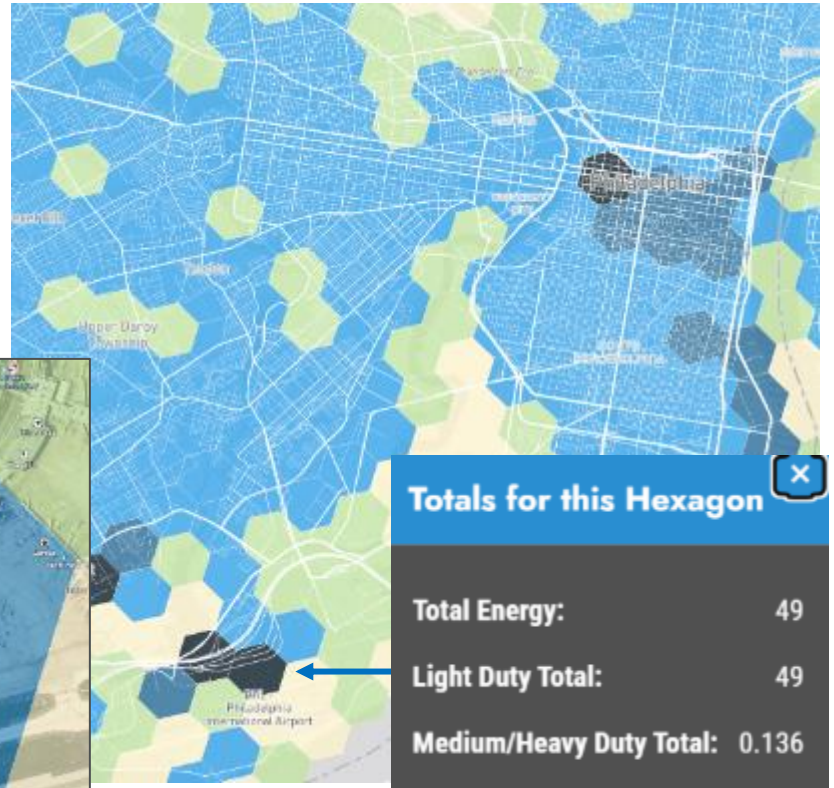


Totals for this Hexagon

Total Energy:	49
Light Duty Total:	49
Medium/Heavy Duty Total:	0.136

Units are MWh/day

- Enterprise
- Avis
- Budget
- Dollar
- Airport Parking

Hex 8 (0.28 mi^2)

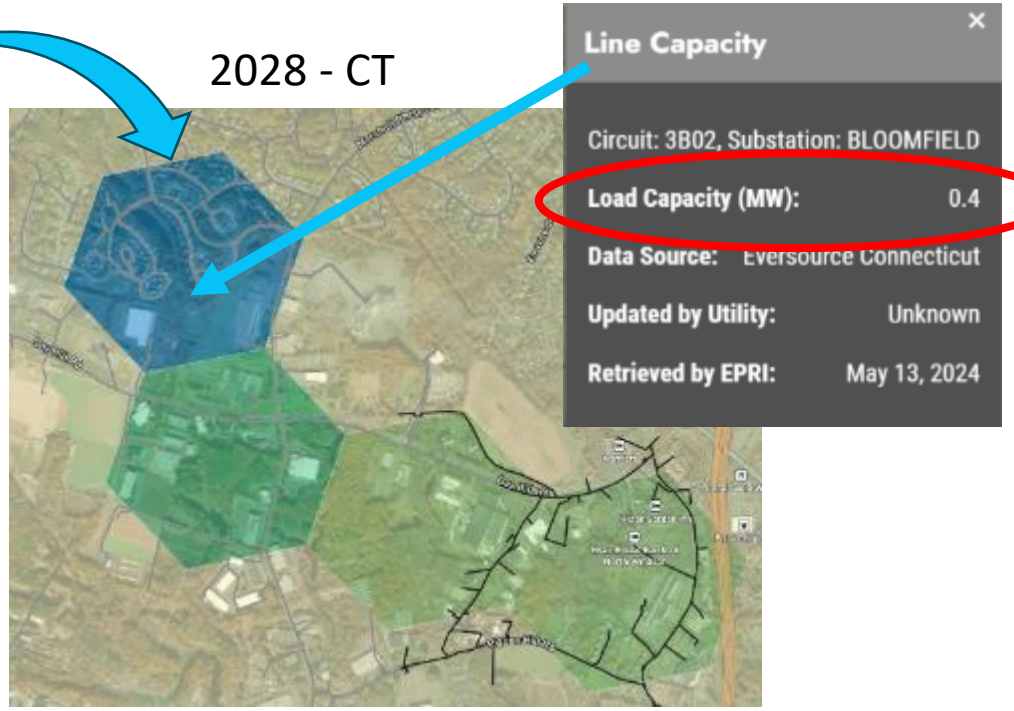
eRoadMAP | Grid Hosting Capacity Maps

Load Capacity Maps from 14 Utilities include:

- **California**: PG&E, SCE, LADWP
- **Connecticut**: Eversource, United Illuminating
- **Delaware**: Delmarva
- **Maine**: Central Maine Power
- **Massachusetts**: National Grid
- **Maryland:** Pepco, Delmarva
- **New York**: National Grid, ConEd, Orange & Rockland, Central Hudson, NYSEG, and Rochester G&E
- **New Jersey**: Orange & Rockland, Atlantic City
- **Rhode Island**: Rhode Island Energy

eRoadMAP | Grid Hosting Capacity Maps

2028 - CT



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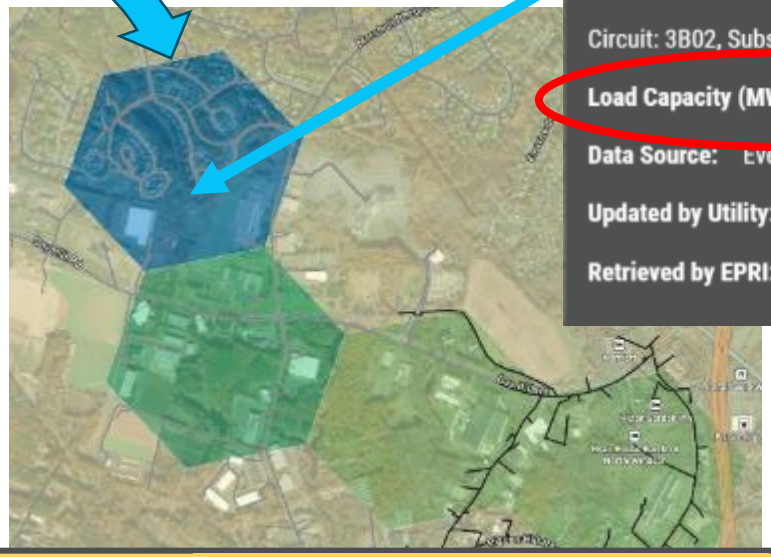
eRoadMAP | Grid Hosting Capacity Maps

2028 - CT



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- **New Jersey**: Orange & Rockland, Atlantic City
- **Rhode Island**: Rhode Island Energy

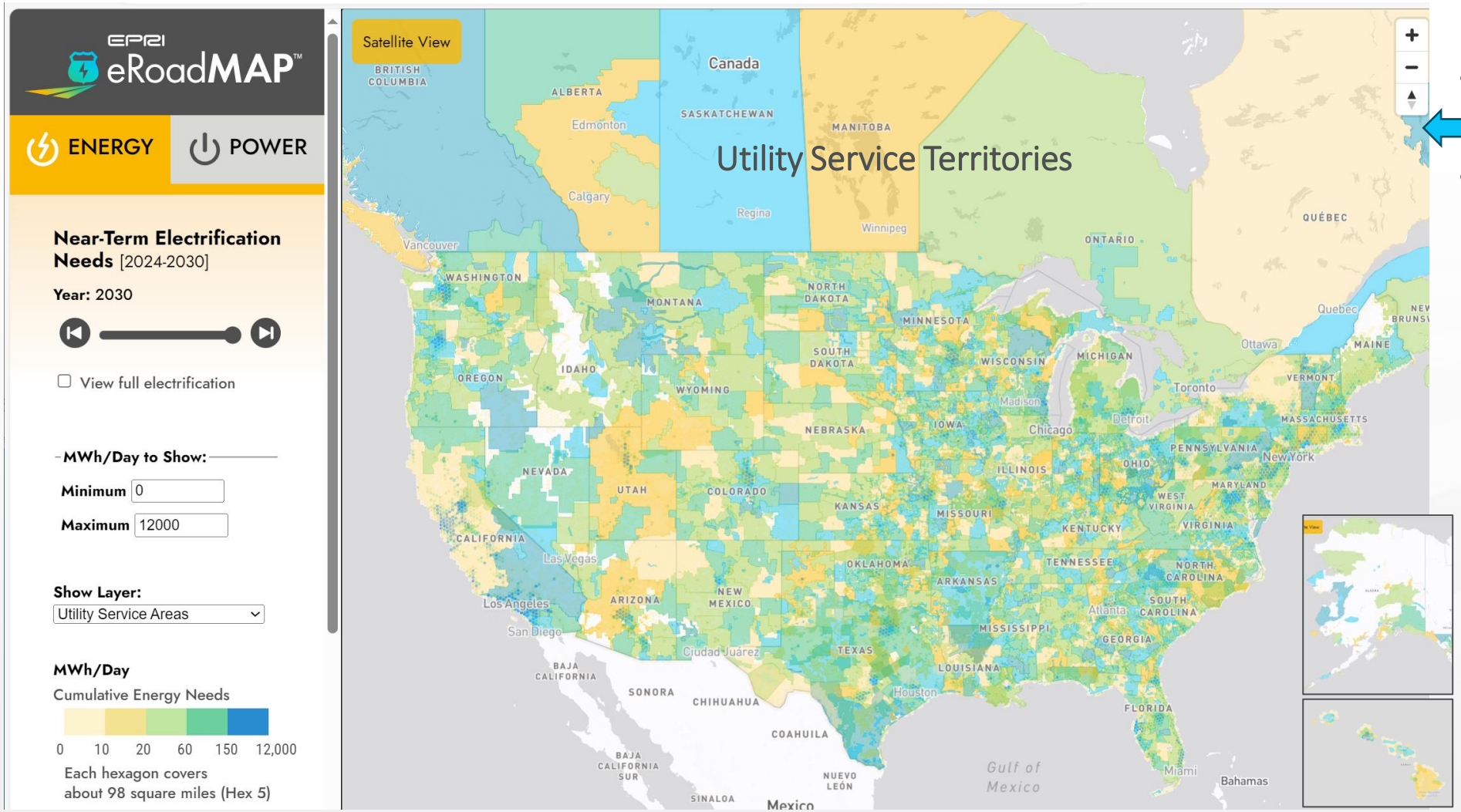
Next (Feeder Level):

- Ameren (IL)
- Dominion
- DTE
- Exelon (ComEd, BGE, PECO)
- FirstEnergy (JCPL)
- Hawaiian Electric
- NV Energy
- PSE&G (NJ)
- Seattle City Light

Next (Substation Level)

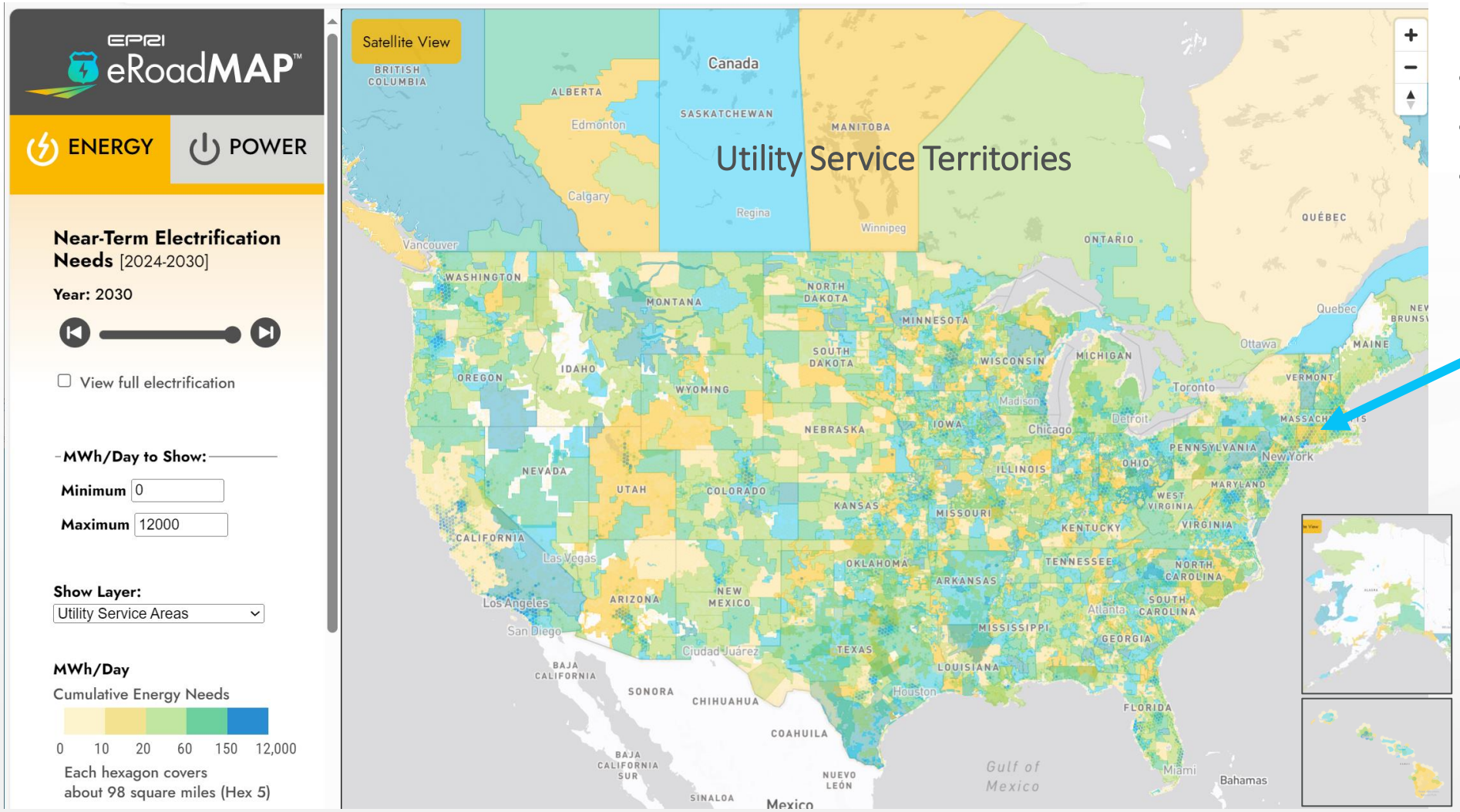
- Ameren (MO)
- Austin Energy
- CenterPoint
- FirstEnergy (All except JCPL)
- Great River Energy
- JEA
- Omaha Public Power District
- Portland General Electric
- Salt River Project
- SMUD

Important Update Coming



- RMI's LDV Data
- Utility Service Territories
- Power (MW) - incl. peak

Important Update Coming



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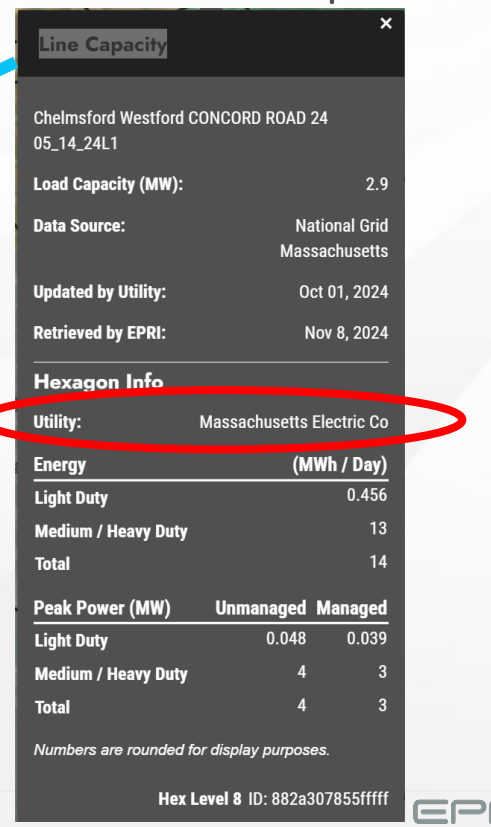
2030 Hex Example



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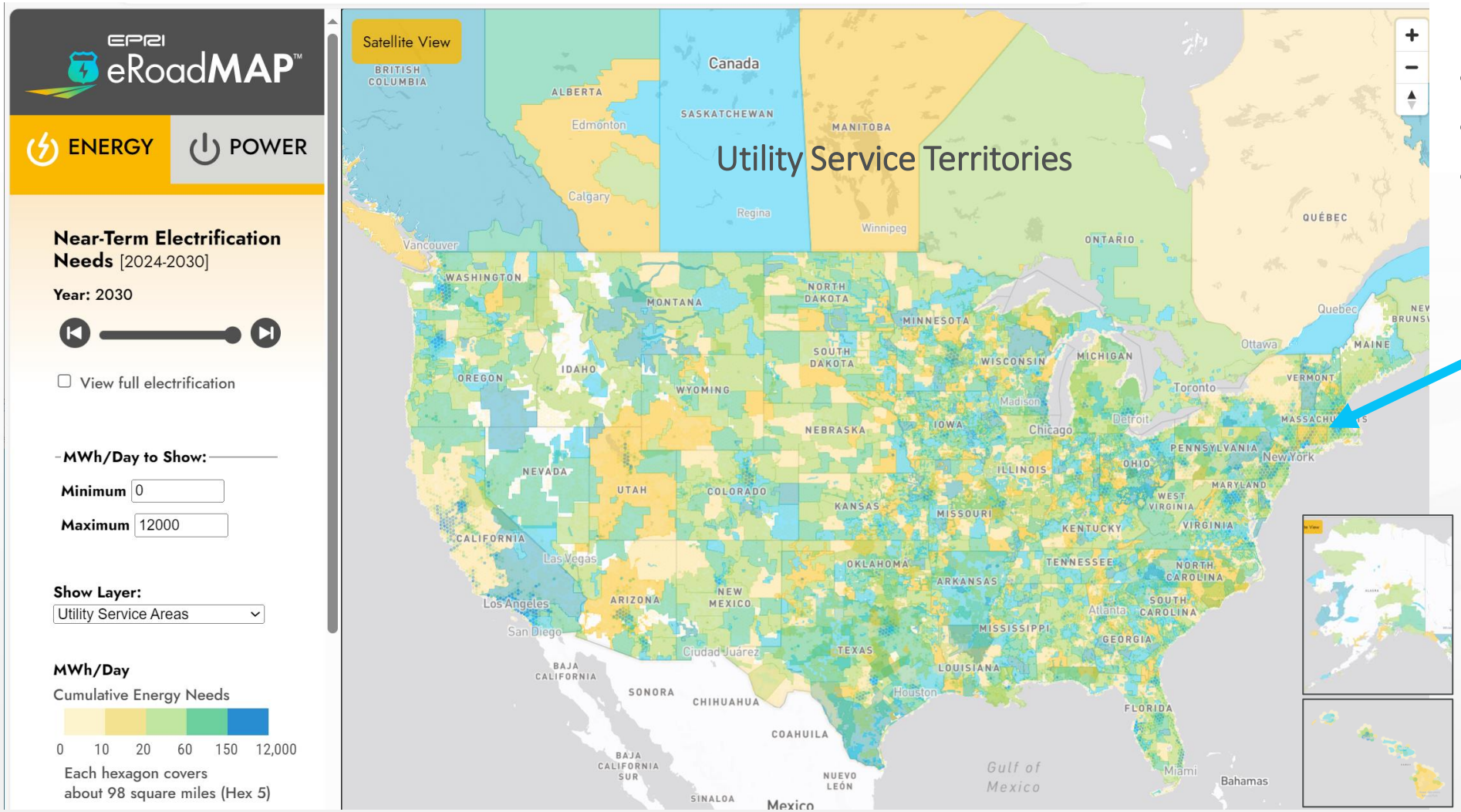


- RMI's LDV Data
- Utility Service Territories
- Power (MW) - incl. peak

2030 Hex Example

Line Capacity

Chelmsford Westford CONCORD ROAD 24 05_14_24L1

Load Capacity (MW):	2.9
Data Source:	National Grid Massachusetts
Updated by Utility:	Oct 01, 2024
Retrieved by EPRI:	Nov 8, 2024

Hexagon Info

Utility:	Massachusetts Electric Co

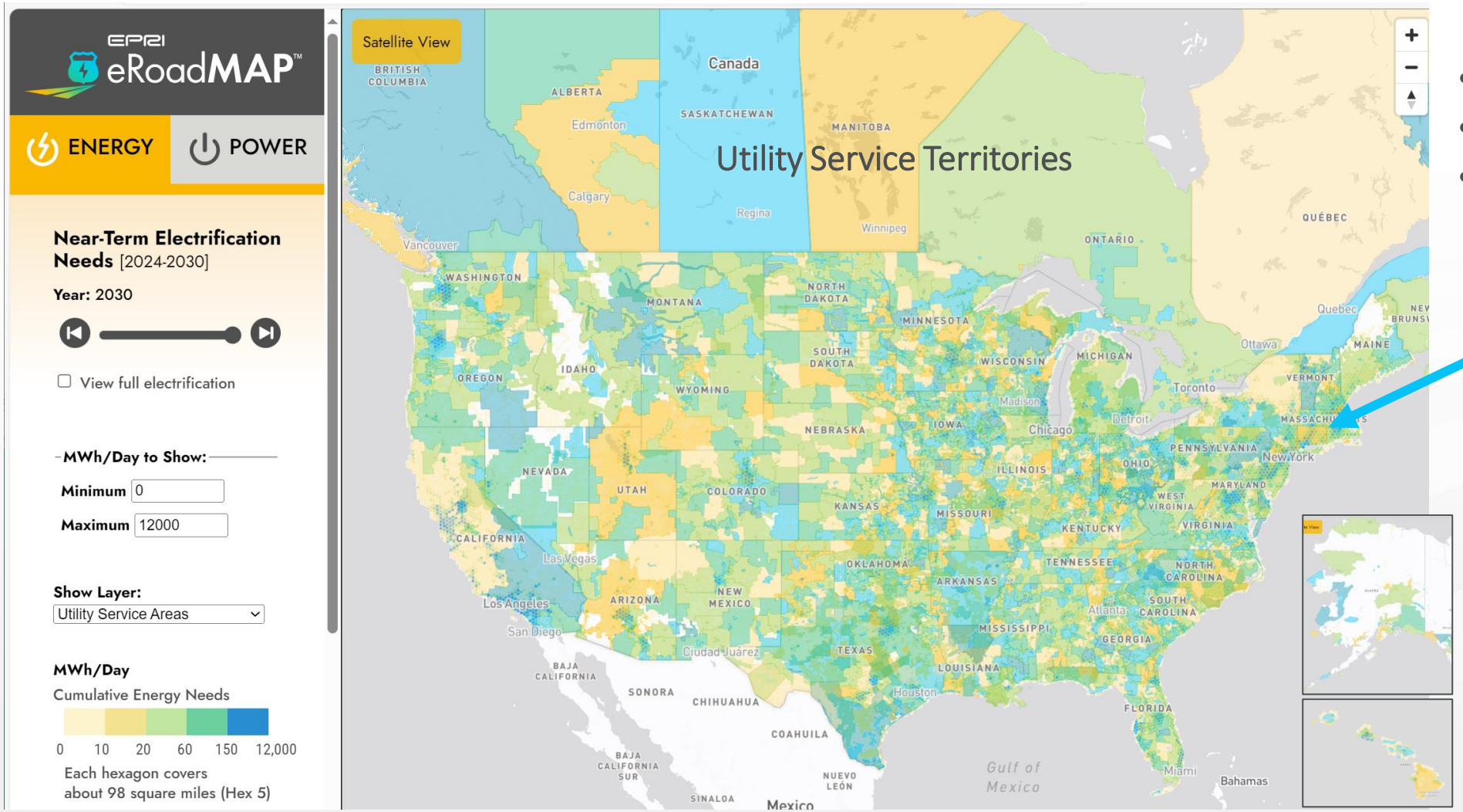
Energy	(MWh / Day)
Light Duty	0.456
Medium / Heavy Duty	13
Total	14

Peak Power (MW)	Unmanaged	Managed
Light Duty	0.048	0.039
Medium / Heavy Duty	4	3
Total	4	3

Numbers are rounded for display purposes.

Hex Level 8 ID: 882a307855fffff

Important Update Coming



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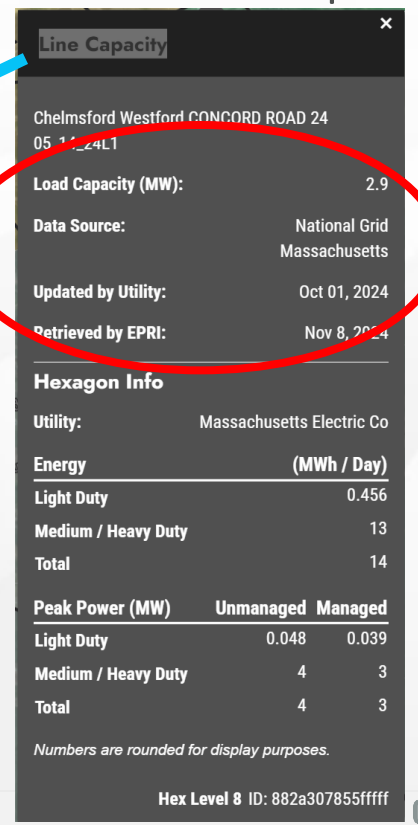
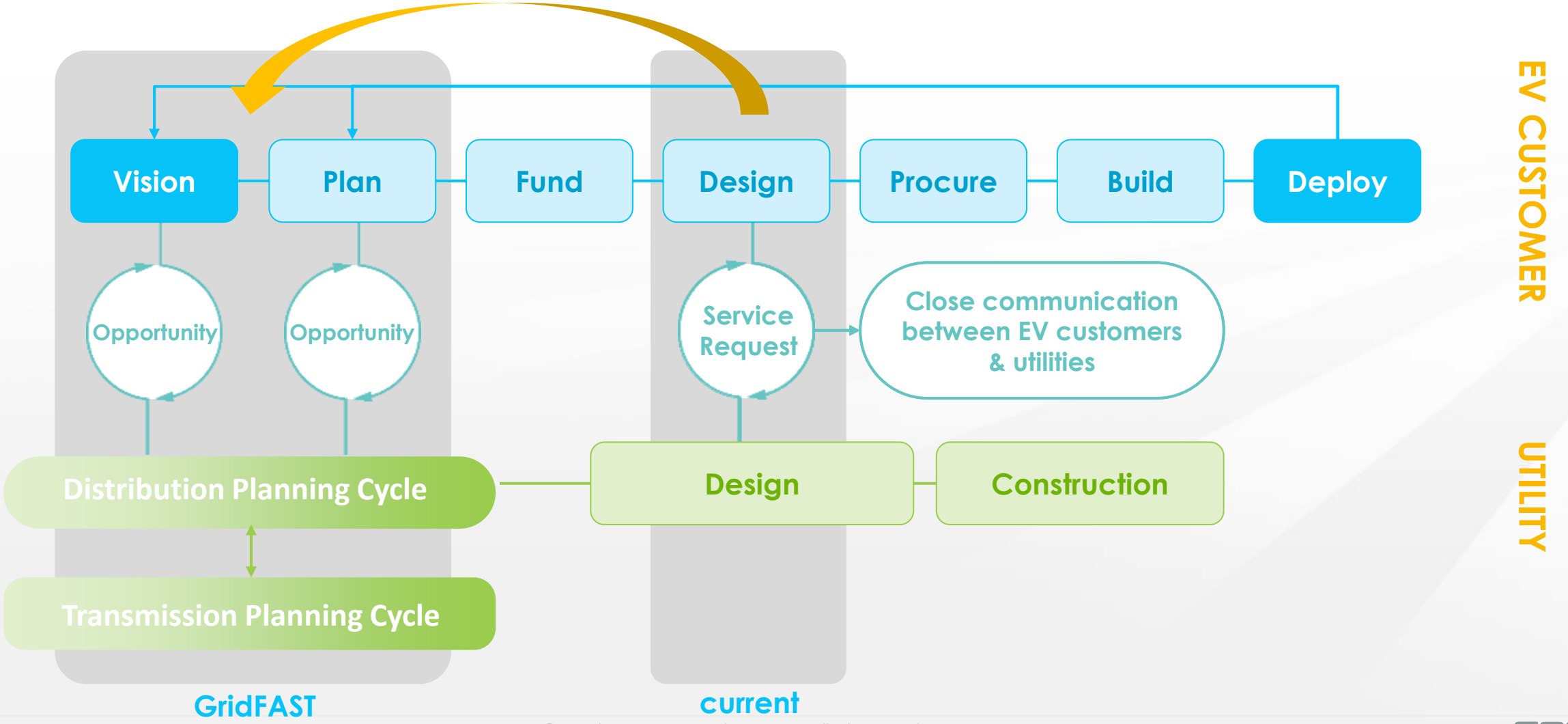


Grid Interconnection Problem

How might we help EV customers and utilities get ***actionable*** information ***earlier***?



GridFAST | Addressing 15 Pain Points in Grid Interconnection

EVs2Scale 2030

Vision & Strategy

Provide tools to educate fleets and **make the case for electrification**

Help fleets forecast where/when to electrify (beyond 2 years) to **drive more certainty in fleet plans**

Create a standard practice (across utilities) to gather fleet plans early so **utilities can incorporate into D&T planning**

Validate fleet plans so utilities can confidently invest in costly grid upgrades

Help smaller utilities establish EV processes so they can better support EV projects

Plan & Forecast

Kickstart fleet communications with the right utility/POC to **eliminate nonvalue-added fleet efforts**

Educate fleets on electricity and utility processes and programs to **eliminate nonvalue-added utility efforts**

Help fleets gain more accurate insights into grid capacity, upgrade timelines and costs, so they can **select more viable locations**

Help utilities provide real-time, updated feeder capacity data so fleets can **select more viable sites before submitting a formal request**

Help fleets model and calculate charging and power scenarios to **minimize costly and potentially unnecessary grid upgrades**

Provide fleets with smart, interactive tools to alleviate utility bottlenecks (e.g., staff shortages) **without having to wait for a utility engineer**

Funding

Help fleets understand how to qualify/apply for grant and incentive programs so they have **full transparency into the process ahead of time**

Design & Engineering

Create a standardized process for service requests across the utility industry to minimize time-consuming and repetitive workload

Help utilities provide more timeline transparency to fleets (e.g. supply chain delays, resourcing, permits, easements) so **fleets can account for it in their project planning**

Approvals & Procurement

Set a standard for fleet x utility best practices to **minimize back and forth and timeline delays**

EPRI

GridFAST

EVs2Scale 2030

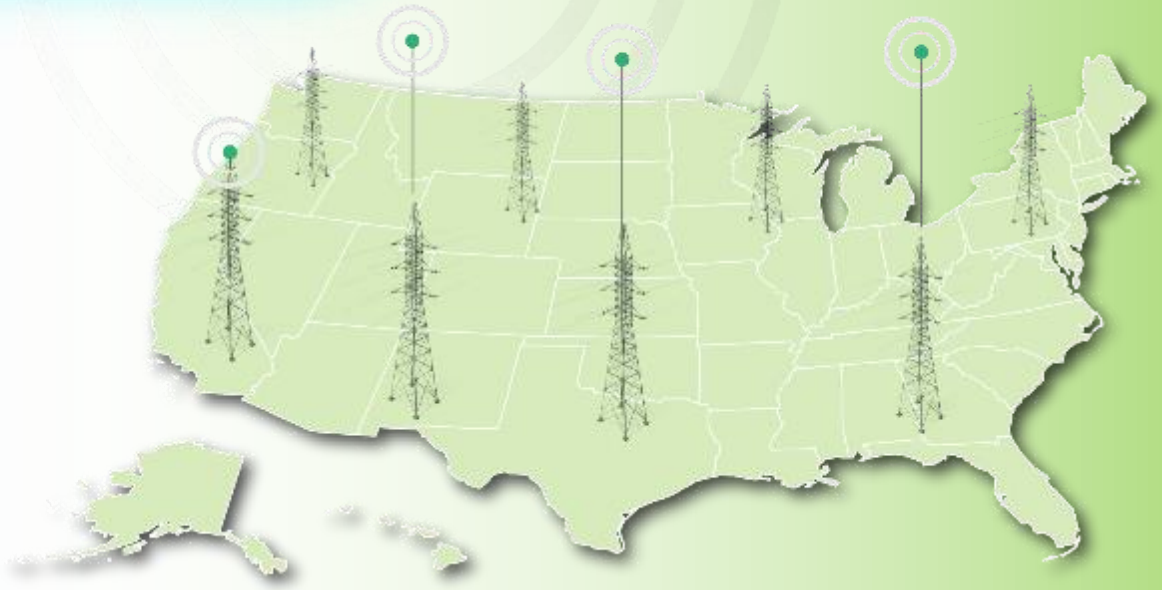
Improve transparency in EV charging planning to inform grid investments and accelerate grid interconnects

2024-2035 plans defining loads, locations, timing

Illustrative

GridFAST
Secure online data exchange platform

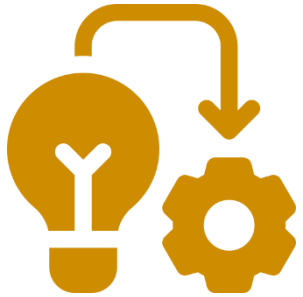
Utility hosting capacity indicating grid readiness, timing to support EV charging loads



EPRI

How GridFAST works at each project stage

The platform is a standardized portal to the utility industry to encourage early project communication, resulting in shorter service request timelines

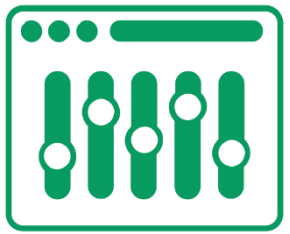


Project Input

EV customers enter their project concepts into GridFAST, and can view hosting capacity maps, if available

Utility Match

GridFAST matches EV projects to the relevant utility to start the exchange based on vetted information



Capacity Information Exchange

GridFAST is an easy and secure system for utilities to provide program and processes info to EV customers

Preparation of Service Request

EV customers finalize project details

Service Request

EV customer information in GridFAST submitted to utility when they're ready to move forward

EV Common Service Application Prototype

EVs2Scale 2030

Common Utility Questions

- Customer Contact Info (primary, contractor, energy billing,…)
- Site Address
- Charging Characteristics (charger ownership,…)
- Service and EV Load Info (kW, voltage, panel size,…)
- Document Uploads (site plan,…)
- Project Delivery (ISD,…)

Custom Utility Questions

SCE	ConEd	SMUD	National Grid	PG&E	Exelon
• Meter access details • Total site square footage		• Overhead vs. underground service • Meter access details • On-site generation?		• Request due to natural disaster? • Desired electric rate • Pre-assessment needed? • Building Permit?	

Regulatory/Policy Outreach

- 13 states completed
  - AZ, CA, CO, FL, GA, IL, MA, MD, MI, NM, NY, PA, TX
- Previewing with the task force and EVs2Scale members on the best forums and key stakeholders to share with
- Summarizes key messaging
- Coordinating with the EPRI-ATE proactive grid build task force

COMING Soon:

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

EPRI GridREADY

PREPARING FOR EV LOADS AT SCALE THROUGH IMPROVED PLANNING, PRIORITIZATION, AND PROACTIVENESS

ILLINOIS

www.epri.com

eRoadMAP™ Identifies Expected High-Load Areas and Resulting Grid Regions Requiring More Proactive Planning

Distribution of expected loads across IL over time (Hex8 level)

Year	2024	2025	2026	2027	2028	2029	2030	100% Elec.
# of hexes showing <1 MWh	201,601	201,558	201,371	200,975	200,251	199,365	198,425	182,908
# of hexes showing 1-3 MWh	38	62	237	614	1,290	2,159	3,060	7,057
# of hexes showing 3-7.5 MWh	19	23	31	37	79	93	129	6,161
# of hexes showing 7.5-10 MWh	7	12	5	11	6	8	7	1,993
# of hexes showing 10-15 MWh	9	10	16	10	17	17	20	1,955
# of hexes showing > 15 MWh	3	12	17	30	34	35	36	1,603

- Hexagons at a resolution of Level 8 represent 0.28 square miles (or ~1-2 distribution feeders)
- Most projected Hex8 loads over time are **< 1 MWh, indicating a load that is relatively easily supported through traditional utility planning processes**
- But **loads > 10 MWh likely require proactive planning today** to achieve customer timelines (e.g. fleet operators, property developers, charging providers)

Engaging early with fleet operators and property/charging developers in these priority locations is critical and will help ensure longer lead-time grid investments are both timely and prudent.

eroadmap.epri.com/

Illinois is Already Benefiting From The Transition to EVs

Economic Development:

- Since 2016, IL has benefited from >$7.77 billion in EV-related investment.[5]
  - EV batteries account for at least $5.2 billion of the total investment
- Since 2016, more than 11,400 jobs have been added in EV manufacturing and the EV supply chain.[6]

Fleet Commitments:

The largest companies in IL, by employment, have plans to electrify their fleets and/or install EV charging stations for customers[7]:

- Walmart (#2): plans to build out a network of DCFC stations across IL and achieve a zero-emission fleet by 2040.[8]
- The City of Chicago (#3) plans to transition **100%** of the City's municipal fleet to EVs or zero-emission alternatives by 2035.[9]
- Amazon (#4): plans to have all 100,000 delivery vans electric before 2030.[10]

Enabling Policies, Processes, + Programs Are Needed to Prepare for EV Loads at Scale

It takes time to evaluate, modernize and adopt utility-enabling processes, policies and programs:

At PUCs, utilities, governing boards:

- ❑ Forecasting policies and practices
  - Bottom-up forecasting with granular fleet data, plans (e.g. eRoadMAP)
  - A planning horizon of at least 10 years
  - Treatment of “pending loads” or "in-queue" loads
- ❑ Robust distribution planning processes
  - ❑ Scenario planning
- ❑ Supportive customer policies
  - Publicly shared load hosting capacity maps
  - Fleet advisory services to access early fleet electrification plans
- ❑ Streamlined interconnection policies for EVs
  - Standardized utility pre-service applications (e.g. GridFAST)
- ❑ Processes for interim power solutions (e.g. power phase-in, “Bridge-to-wires”)
- ❑ Utility workforce development and training programs to meet grid needs at scale
- ❑ Cost recovery policies and practices
  - Flexibility to pre-authorize "no-regrets" investments (e.g. Memorandum accounts for EV projects)
  - Address first-come/first-served line extension policies (fairness and equity issue, small fleets)
- ❑ EV rate design and tariffs
  - Recognize near-term vs. long-term customer economics (e.g. demand charges, home/depot vs. away, TCO)
  - Recognize the grid and community benefits of vehicle-to-grid integration (VGI), including managed charging and V2G in eSchool Buses for community resilience

Regulatory Policy Workstream

Educate and Provide Expertise

- **Government**
  - DOE/Joint Office
  - National Labs
  - EPA
  - Congress
  - TX DOT (MHD task force)
- **Commissioners**
  - Commissioner Peretick (NARUC EV Working Group Chair)
  - NARUC EV Working Group
  - NARUC-DOE TE planning workshop
  - Meetings with PUC/PSC staff (NY EVIIWG)
- **Associations**
  - Utility: APPA, NRECA, EEI, ATE
  - National Association of State Energy Officials (NASEO)
  - American Association of State Highway Transportation Officials (AASHTO)
  - National Association of State Utility Consumer Advocates (NASUCA)
  - National Governor's Association (NGA)
- **Trade / Business Groups**
  - Electric Drive Transportation Association (EDTA)
  - Zero Emission Transportation Association (ZETA)
  - Advanced Energy United
  - CERES (CEVA)
- **NGOs**
  - Environmental Defense Fund (EDF), NRDC
  - Southern Alliance for Clean Energy (SACE), Great Plains Institute (GPI)
  - World Resources Institute (WRI)
  - Calstart, Plug In America (PIA), Electrification Coalition (EC)
  - ICCT, Atlas Public Policy
- **Cities**
  - U.S. Climate Mayors
  - Clean Cities

Focus on:

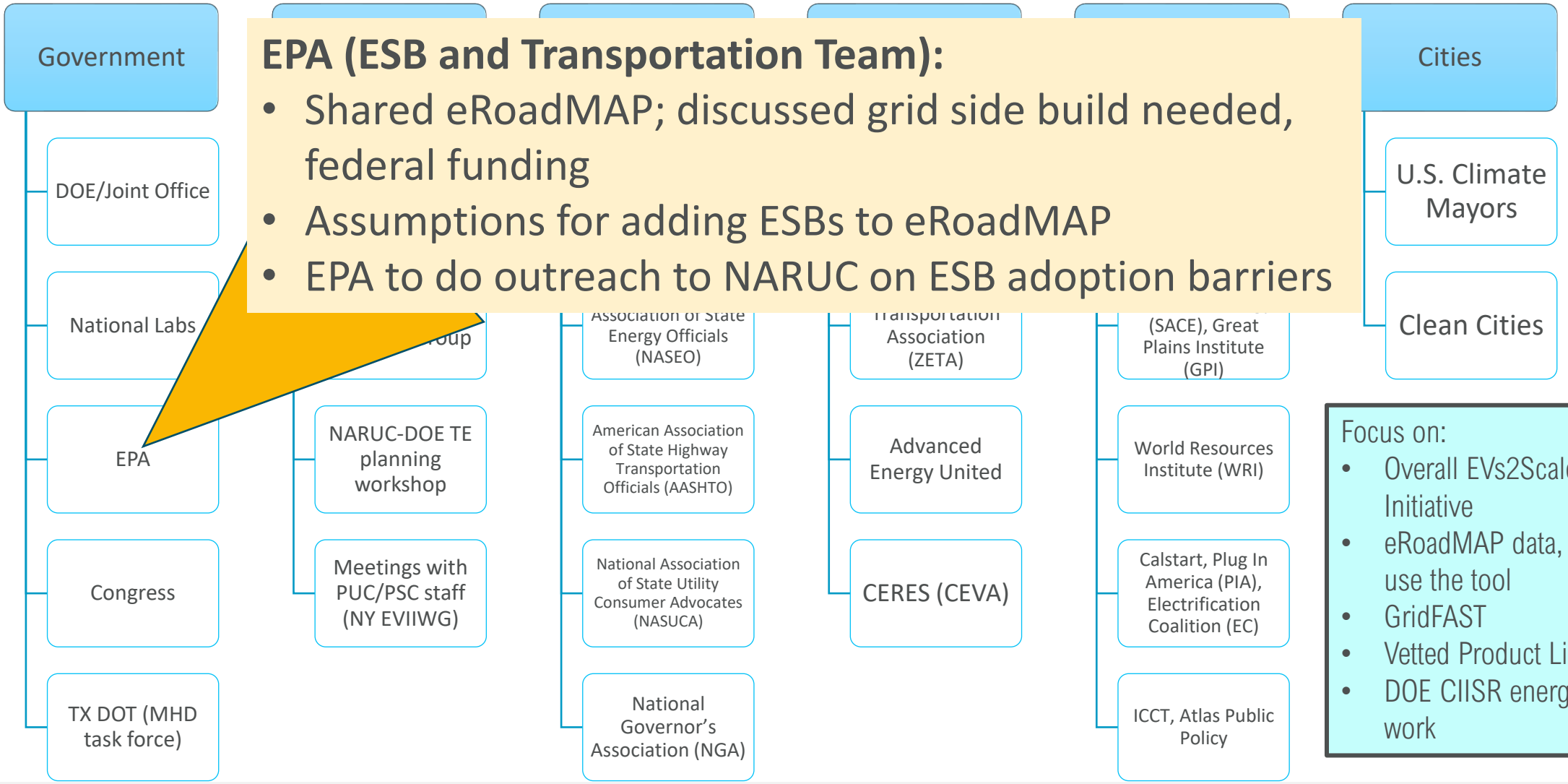
- Overall EVs2Scale 2030 Initiative
- eRoadMAP data, how to use the tool
- GridFAST
- Vetted Product List (VPL)
- DOE CIISR energization work

Regulatory Policy Workstream

Educate and Provide Expertise

EPA (ESB and Transportation Team):

- Shared eRoadMAP; discussed grid side build needed, federal funding
- Assumptions for adding ESBs to eRoadMAP
- EPA to do outreach to NARUC on ESB adoption barriers



Focus on:

- Overall EVs2Scale 2030 Initiative
- eRoadMAP data, how to use the tool
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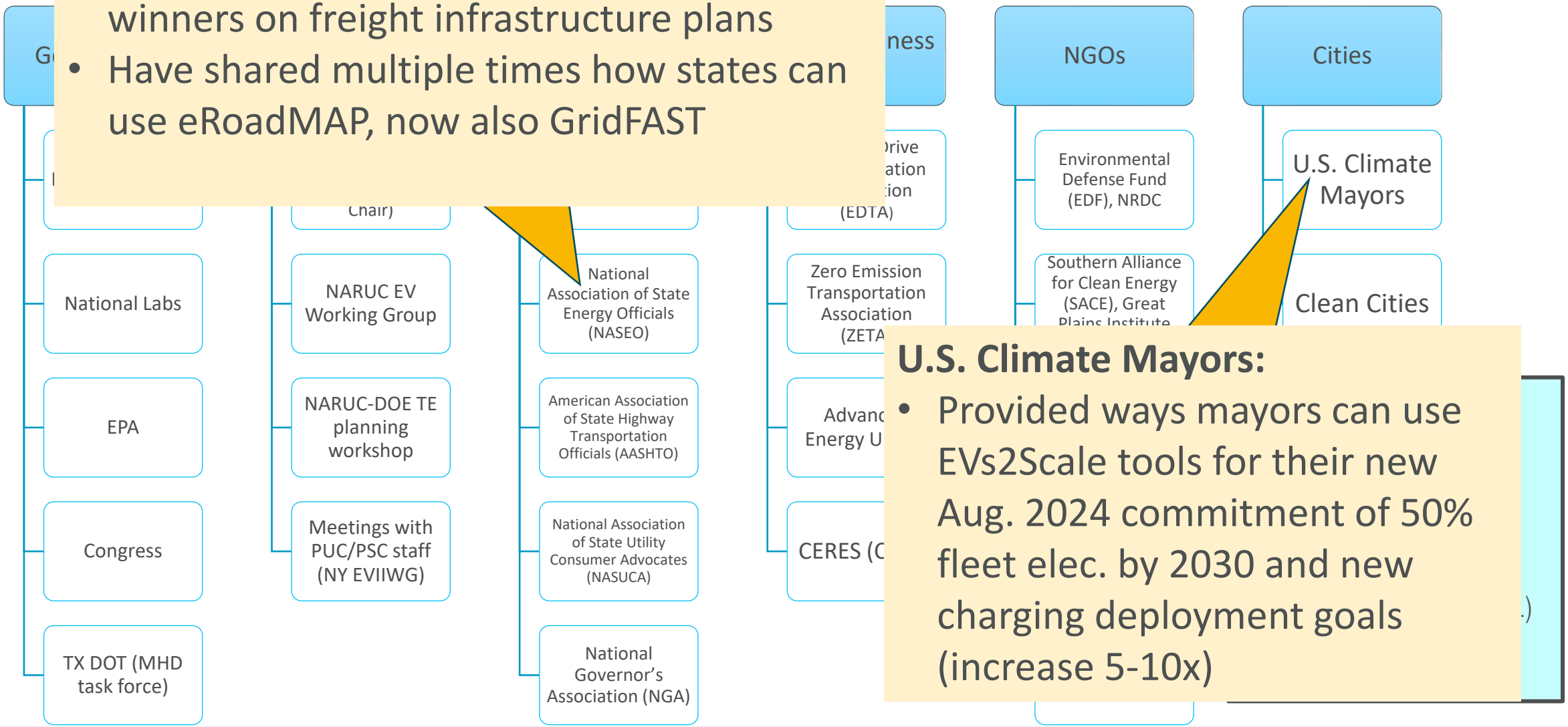
Regulatory Policy Workstream

Ed

NASEO:

- Working with NASEO and their state RFP winners on freight infrastructure plans
- Have shared multiple times how states can use eRoadMAP, now also GridFAST



U.S. Climate Mayors:

- Provided ways mayors can use EVs2Scale tools for their new Aug. 2024 commitment of 50% fleet elec. by 2030 and new charging deployment goals (increase 5-10x)

Released Reports + Tools

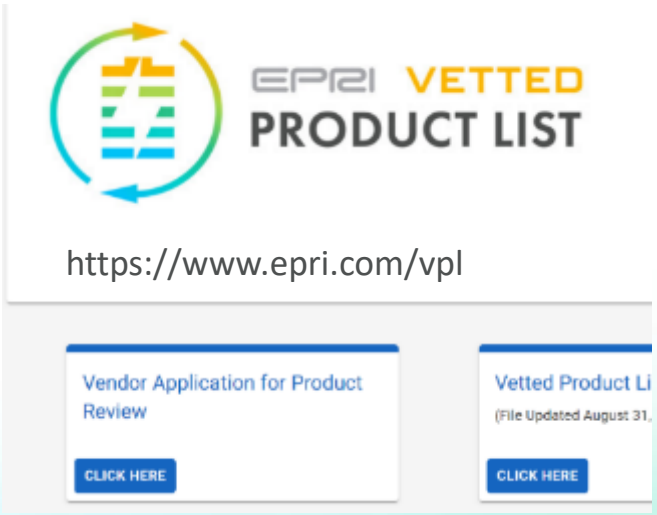
1

EVs2Scale Website

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

2

VPL (Vetted Product List)

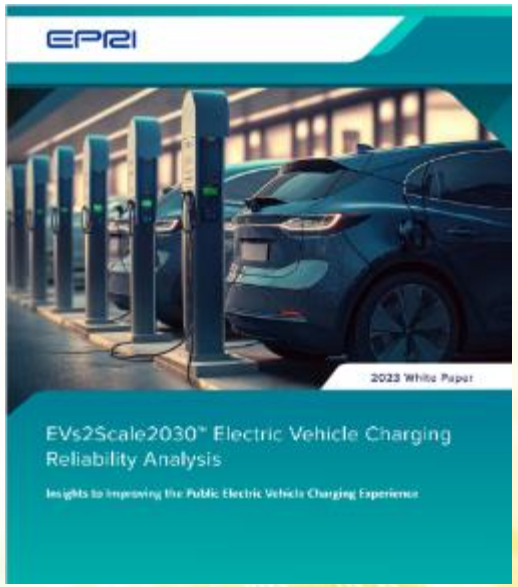


3

Grid Primer

4

EV Charging Reliability Analysis



5

eRoadMAP™

6

EVs2Scale 2030

Thank You