



# Grid Planning for Electric Vehicles

EVs are coming – is the grid ready?

Inalvis Alvarez Fernandez, Ph.D.

SMMC  
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# 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

# On-Going Collaborative Project:

## Fleet Electrification Planning and Assessment

[Jan 2022 – Dec 2023]

**Objectives:** Supporting utilities in planning and preparing the grid for fleet electrification using advanced analytics and tools

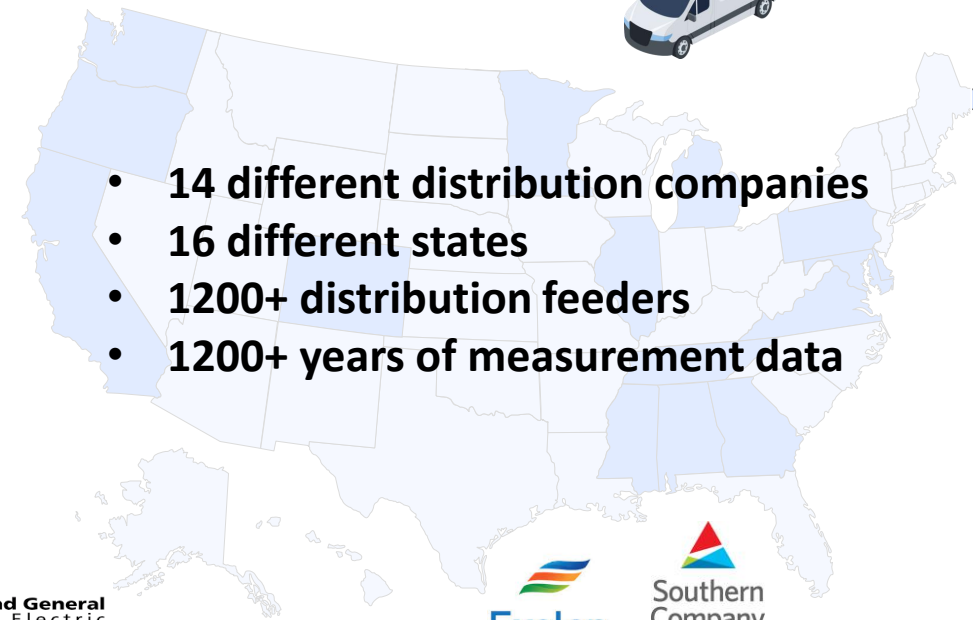
### Approach:

#### ■ Fleet Electrification Characterization

- *Fleet Travel Patterns and Needs Assessment*
- *Technology Maturity Assessment*
- *Charging Strategies and Applications*

#### ■ Grid Planning for Fleet Electrification

- *Assess system-wide grid electrification opportunity*
- *Future fleet electrification assessment*
- *Grid readiness and integration assessment*



- **14 different distribution companies**
- **16 different states**
- **1200+ distribution feeders**
- **1200+ years of measurement data**



# Identifying Future Fleets | Where, When, How Many?

## Where?

- **Where** are the fleets dwelling?
- **Where** are likely warehouses that may have electric vehicles?
- **Where** would they charge en-route?

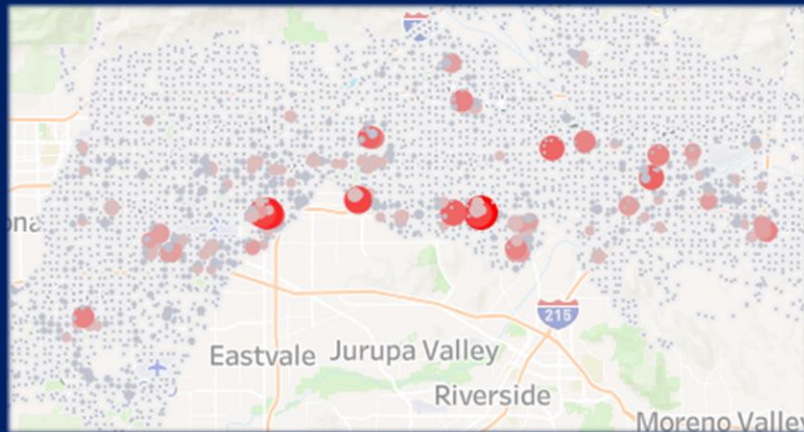


Figure: Vehicle activity maps

## When?

- **When** would fleets most likely charge?
- **When** would we expect different vehicle fleets to electrify?
- **When** would it be best for vehicle to charge?

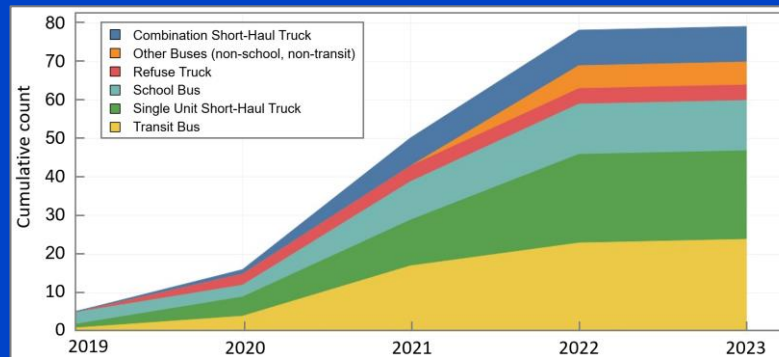


Figure: Technology Maturity

## How Many?

- **How many** MDHD vehicles are there currently?
- **How many** vehicles would be located at one location?

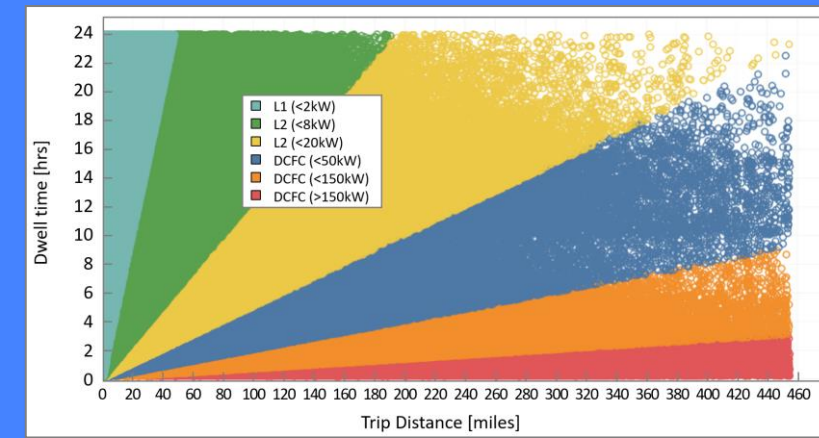
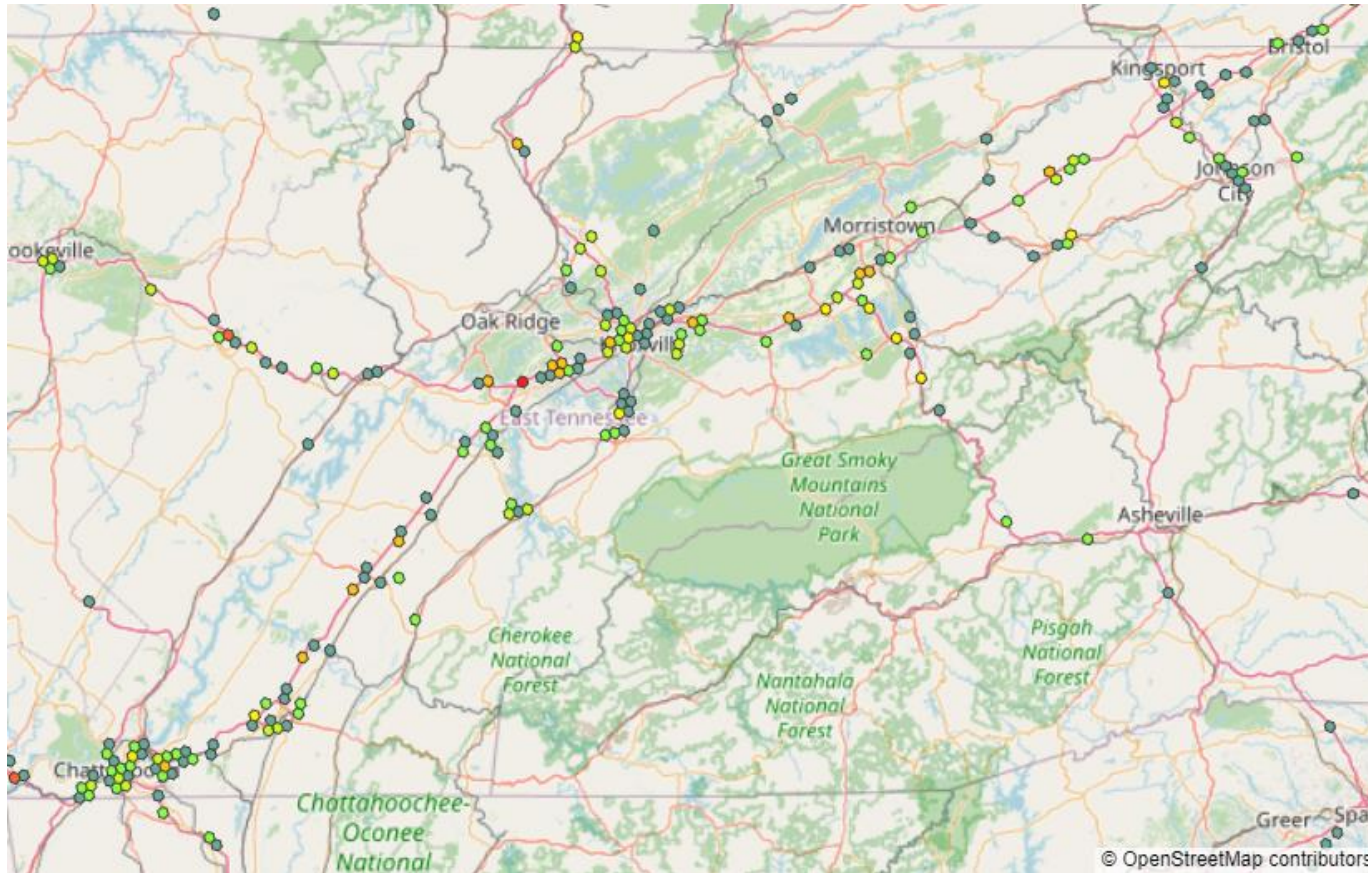


Figure: Charging Needs

All these questions vary by vehicle segment

# Future Fleet Assessment | Fleet activity map

*Based on their dwell time, what will their charging needs be?*



Daily Energy Needs

- 5-10 MWH
- 10-20 MWH
- 20-30 MWH
- 30-50 MWH
- 50-100 MWH
- 100-150 MWH
- 150 MWH+

Vehicles that stopped in TN on 6/12

- Day of the year with the most trips

Data aggregated:

- $\frac{1}{4}$  sq mile per hex

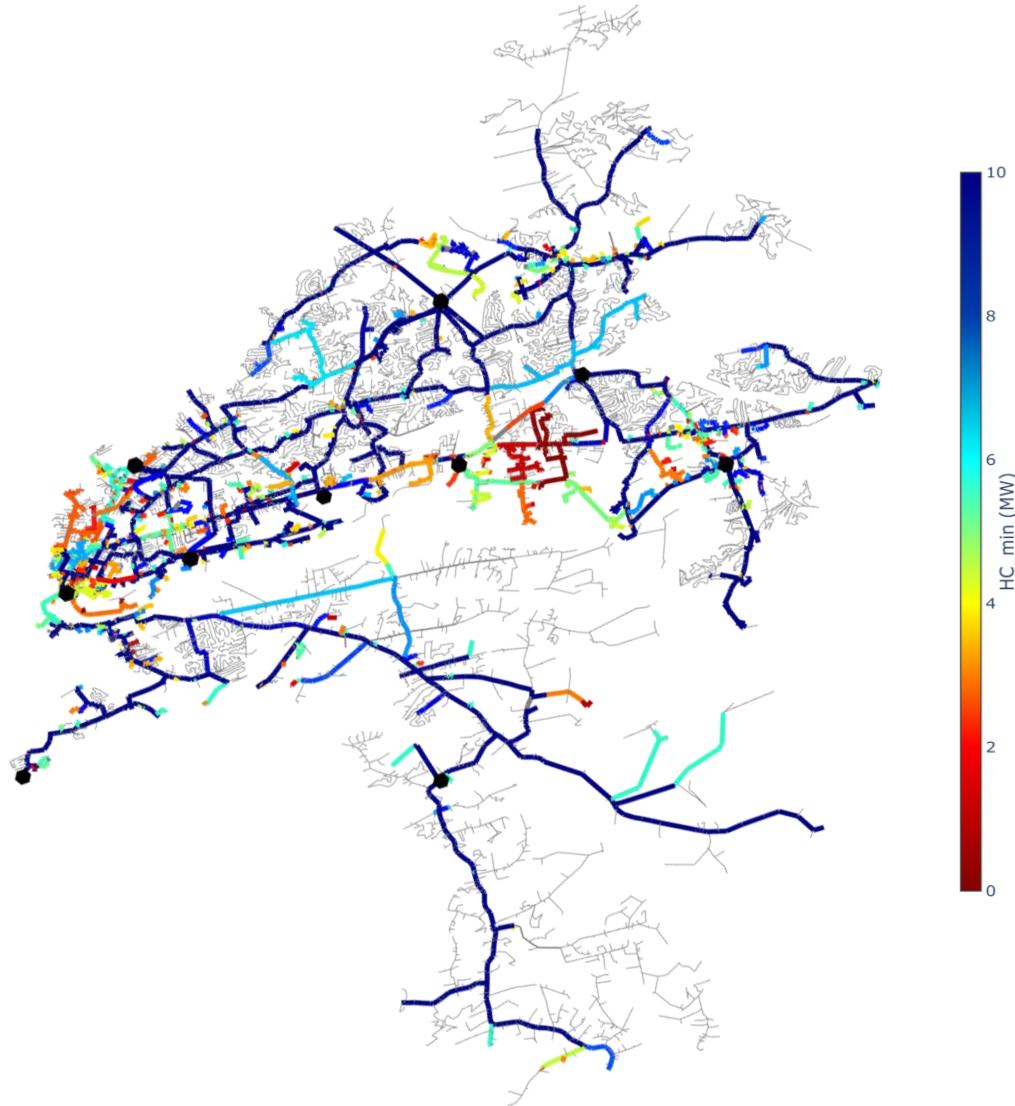
Energy was calculated by assuming that the total mileage for the vehicles for the day would be charged at their largest stop times:

- MD: assumed efficiency of 2 kWh/mi
- HD: assumed efficiency of 3 kWh/mi

**Estimated Daily Energy Needs**

# EV Hosting Capacity Assessment

*Do we have existing capacity to accommodate EVs?*



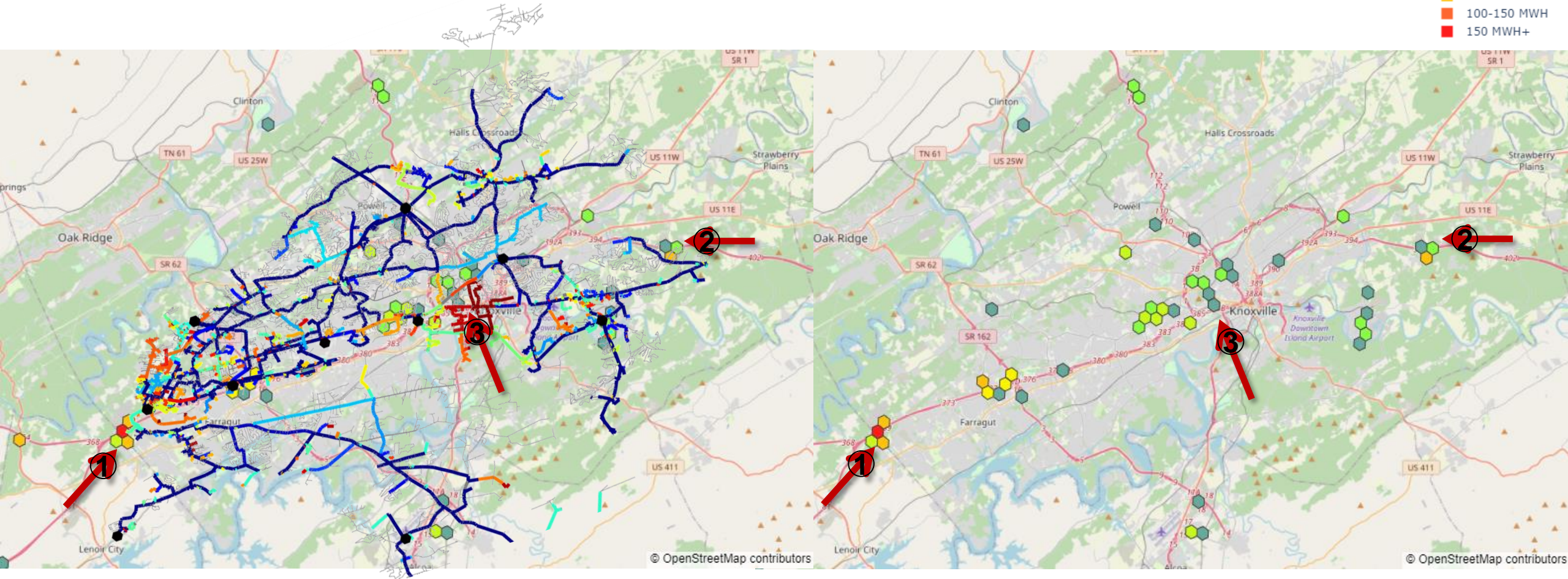
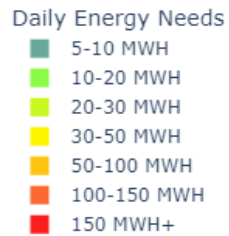
*Assessing the **electrification opportunity** across a utility's territory*

*Identify **high-priority feeders** for **grid-strengthening measures***

*Identify **under-utilized assets** to **incentivize fleet electrification***

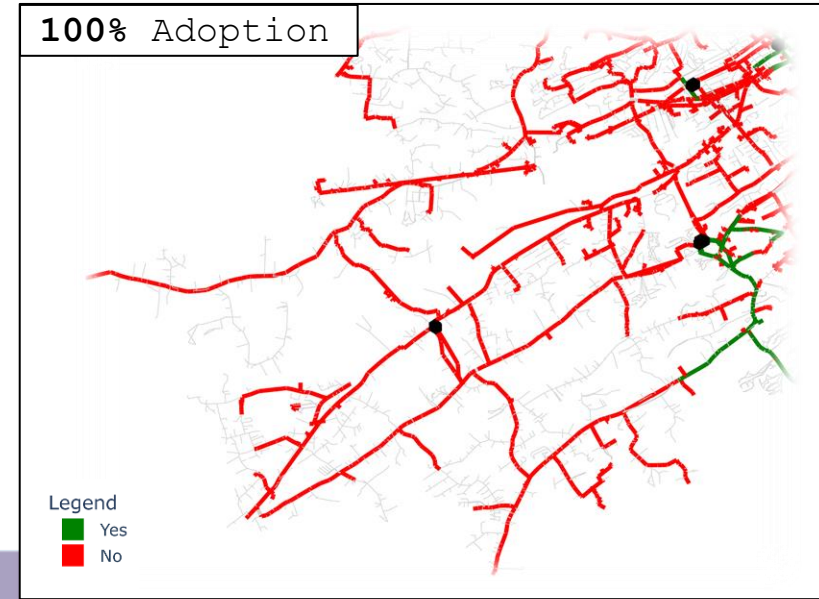
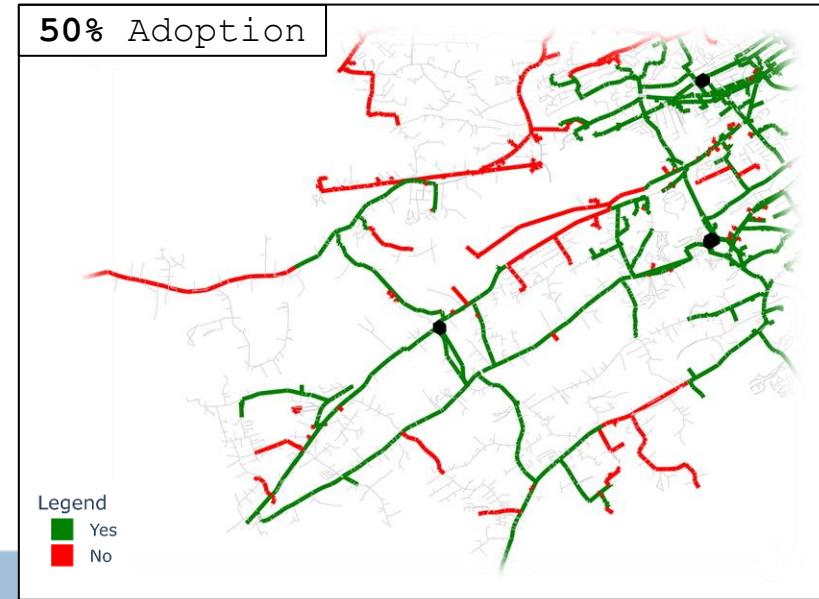
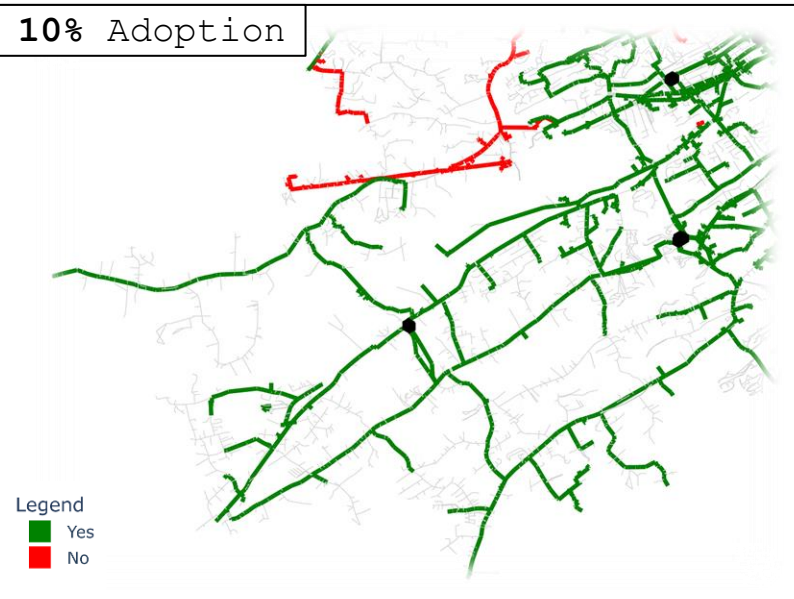
# Grid Readiness and Integration Assessment

## *Is there capacity where vehicles are dwelling?*



# Grid Readiness and Integration Assessment

*Where can the grid handle the new fleet EV demand?*



***Constraint Analysis | Feasibility***

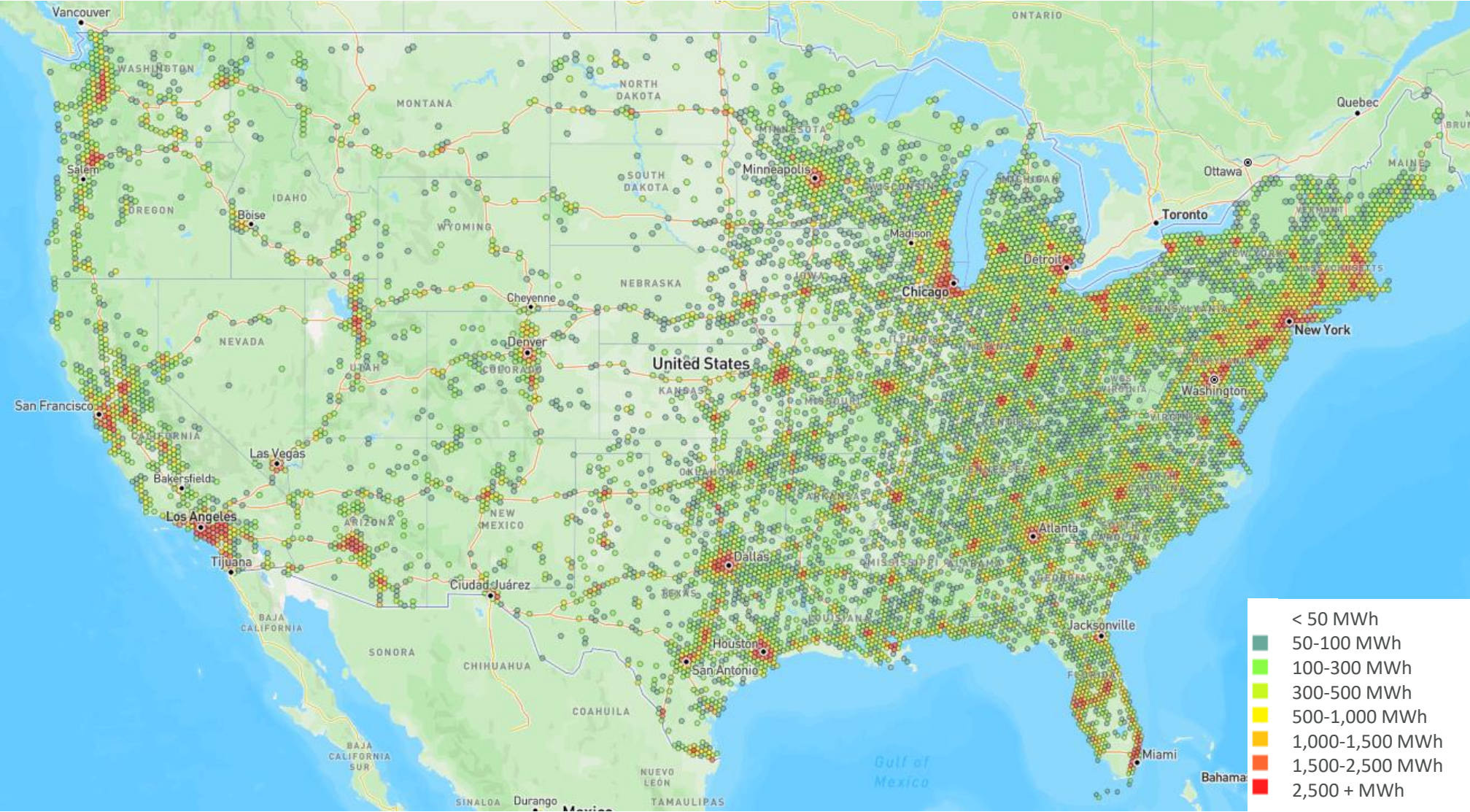




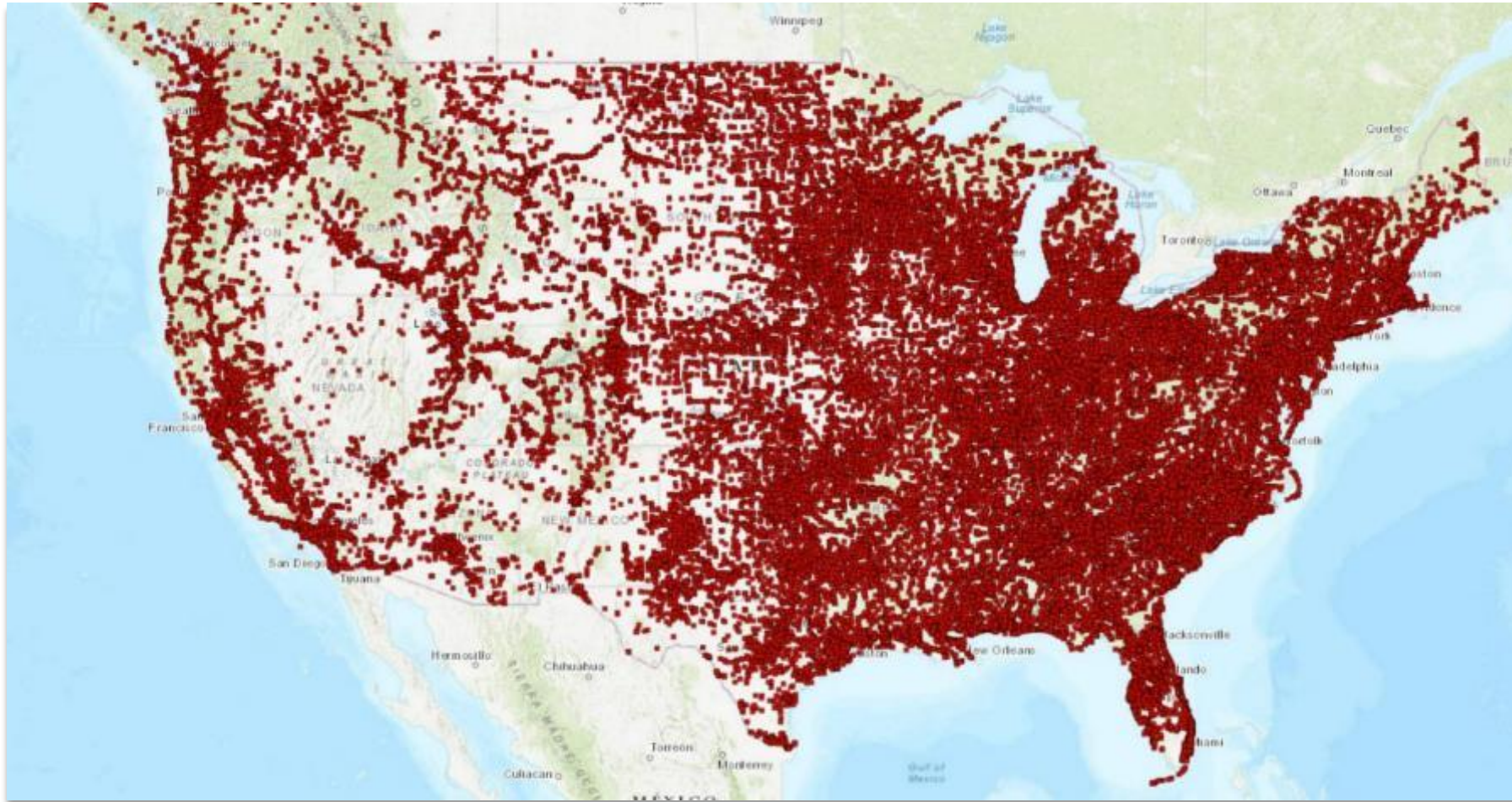
**What about the rest of the U.S.?**

# LD + MDHD | 100% Electrified

H5 – 98 sq miles per hex



# Grid Capacity Planning



## Includes

- Substation name
- Lat/long coordinates
- Max/Min voltage

## Does not include

- Rated capacity
- Load

Geospatial Energy Mapper (GEM), Argonne National Laboratory, <https://gem.anl.gov/>

## ***Database of Substations***

# 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

# 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

**Program Director:** Britta Gross  
**Contact:** Courtney Wallace ([cwallace@epri.com](mailto:cwallace@epri.com))

A blue-tinted photograph of four people, two men and two women, standing together. They are wearing EPRI-branded clothing: lab coats, a polo shirt, and a hard hat. The text "Together...Shaping the Future of Energy®" is overlaid in white on the image.

**Together...Shaping the Future of Energy®**

Contact  
Information:

