

# Plug It In: Where are We with Connecting to GEBs and EV Programs

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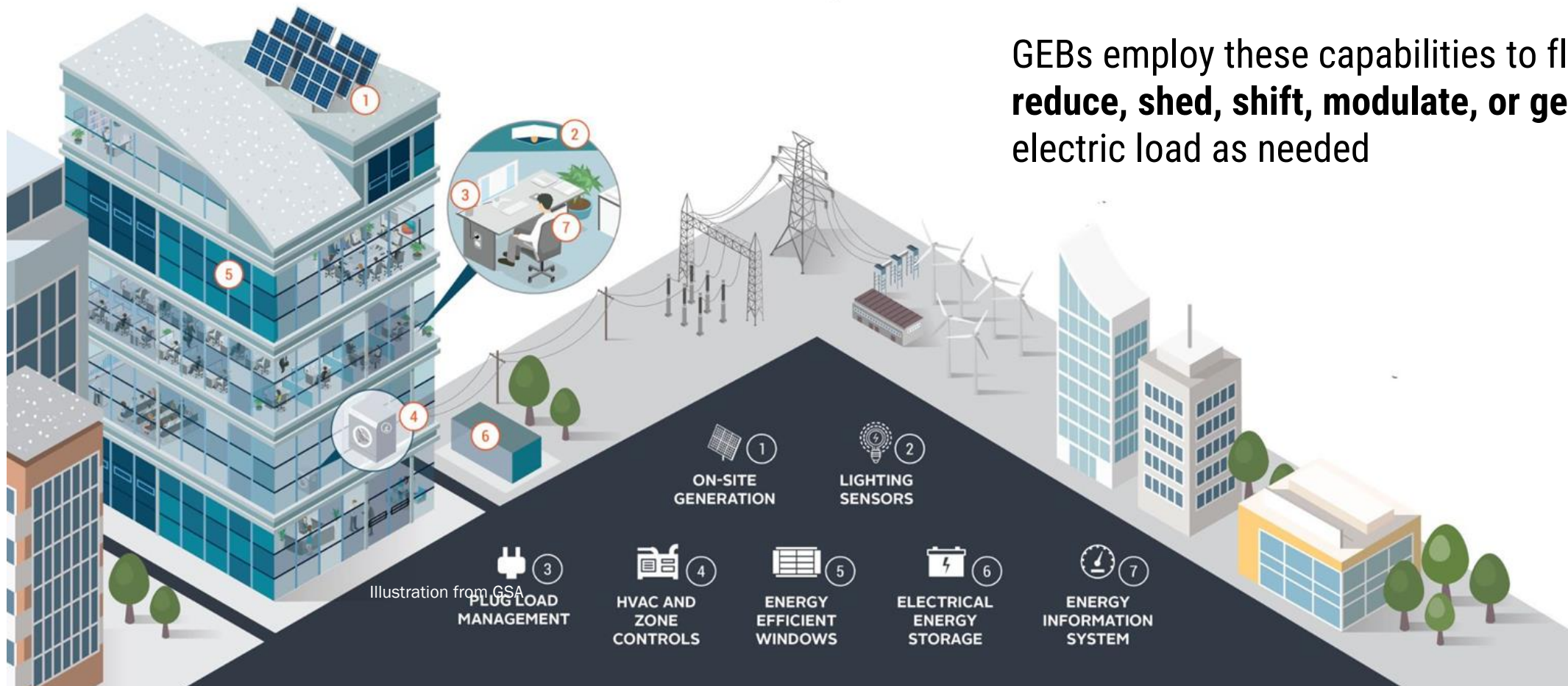
Feb 1st, 2023



# What are GEBs?

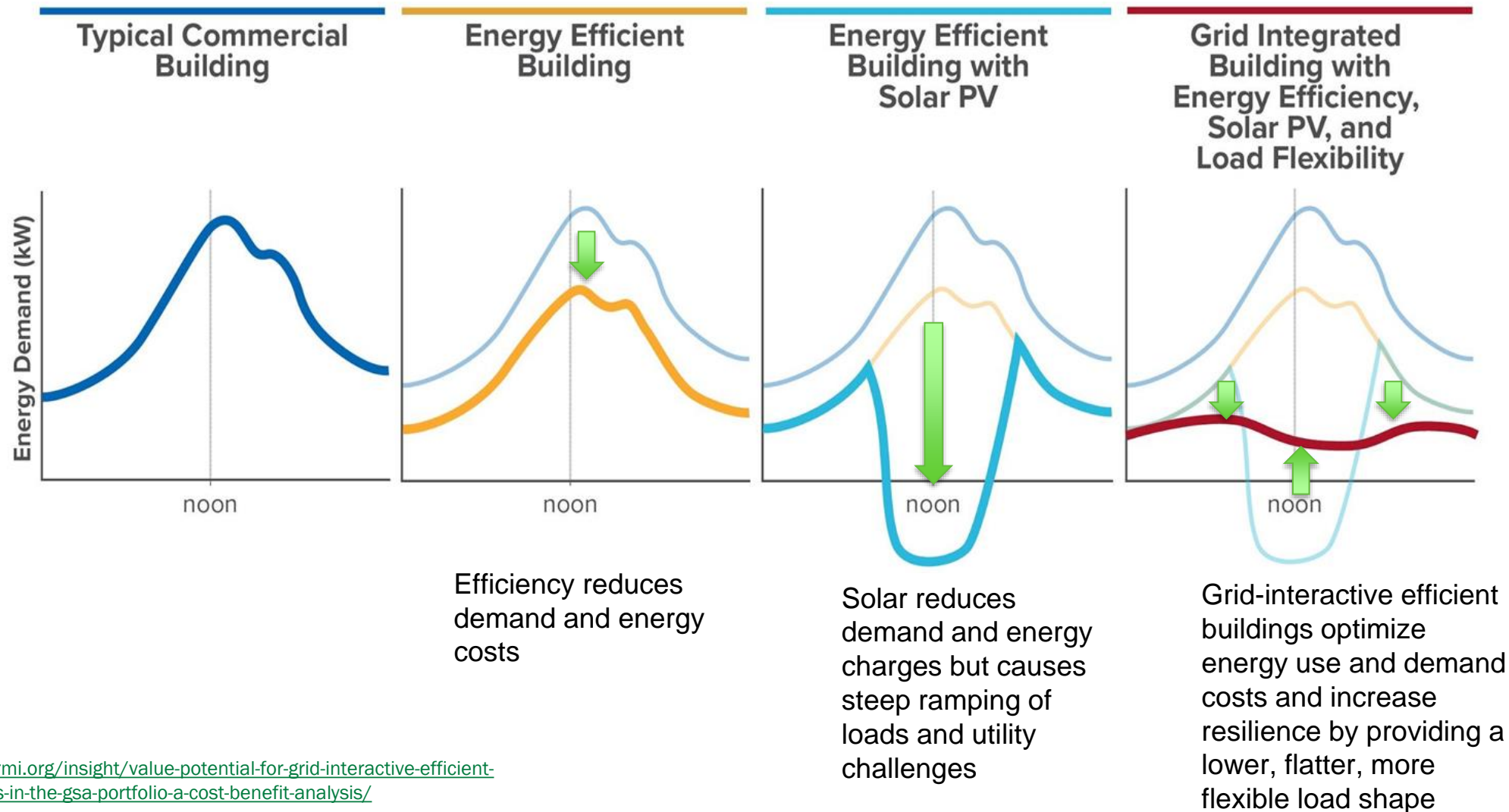
GEBs incorporate energy efficiency, renewables, energy storage, and load flexibility

GEBs employ these capabilities to flexibly **reduce, shed, shift, modulate, or generate** electric load as needed





# GEB Load Profile Potential - Example



<https://rmi.org/insight/value-potential-for-grid-interactive-efficient-buildings-in-the-gsa-portfolio-a-cost-benefit-analysis/>

# Federal Smart Building Accelerator Overview

**As referenced in the Energy Act of 2020, the FEMP has launched the Federal Smart Buildings Accelerator to identify and implement specific approaches to accelerate the adoption of smart building and grid responsive technologies.**

This accelerator is meant to overcome real-world barriers to GEB implementation by providing TA and support for plan development to specific Federal sites around the country.

The goals of the accelerator are to:

- ▶ **Screen and identify Federal buildings** for potential GEB adoption with various types and sizes of facilities and in various geographic locations.
- ▶ **Develop and pilot resources** for GEB opportunity identification, deployment, and successful adoption of GEB technology in Federal facilities in the U.S.
- ▶ **Create action plans** for implementing identified GEB technologies that agencies can implement post accelerator effort.
- ▶ **Produce trainings** for GEB technology operators to ensure peak energy savings and the use of best practices, along with guides and strategies to implement GEBs smoothly and efficiently

Opportunity to Partner: if a utility has a federal site they would like to promote GEB, let us know!

# EVs as GEBs



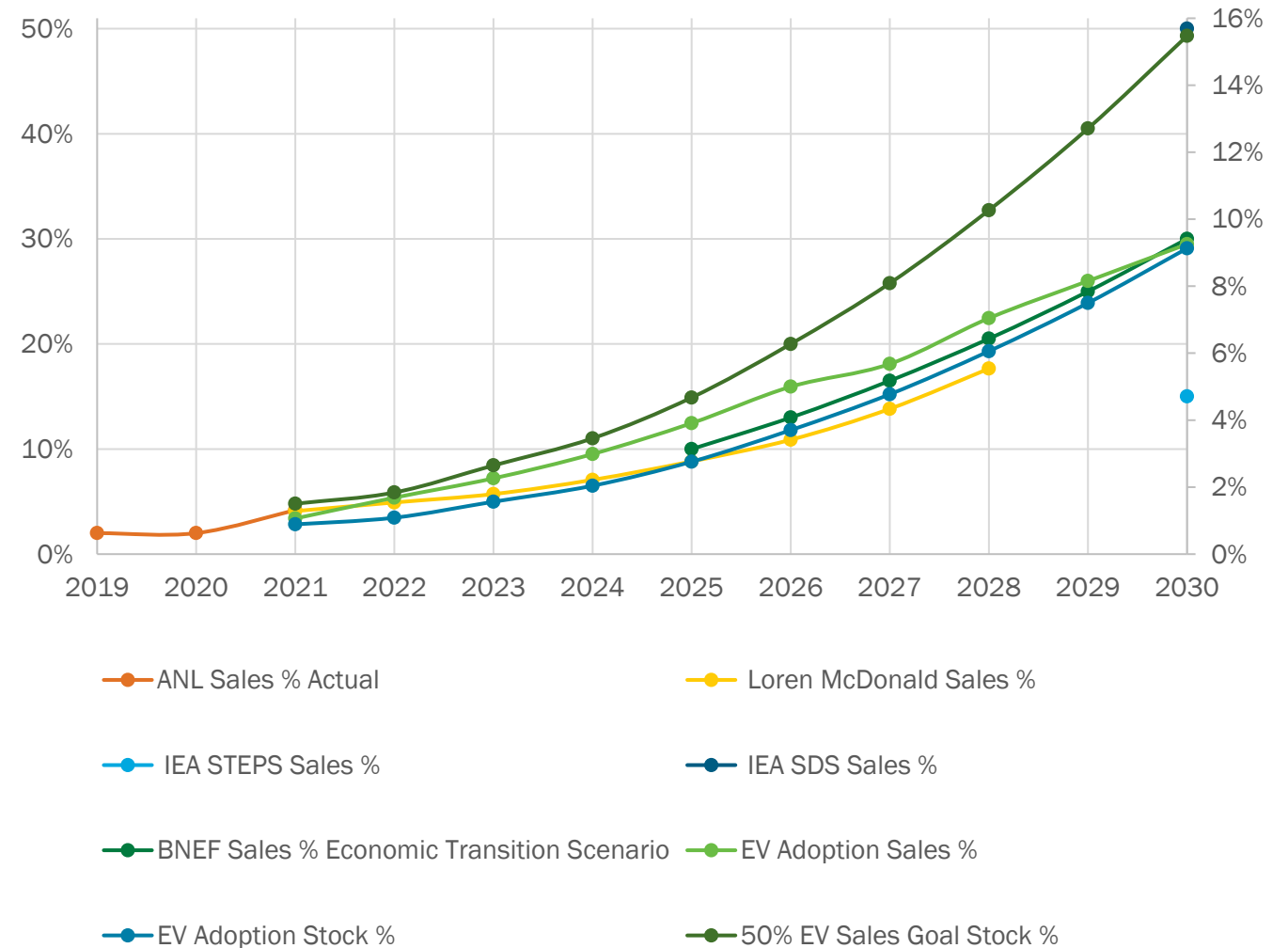
1. EVs are a new BIG electric load that is coming...and fast!
2. New faster charging & longer-range batteries are coming soon
3. R&D around wireless charging is underway
4. BUT we have an opportunity to make EVs a mobile battery solution for
  - ✓ Demand response/load mgmt [charge off peak]
  - ✓ GEB load mgmt. [charge off peak and draw at peak]
  - ✓ Resilience [draw power in emergencies]
5. Fleets talk to your utility about planning support and incentives

# Planning: EV Penetration Projections

## Planning for Workplace Charging

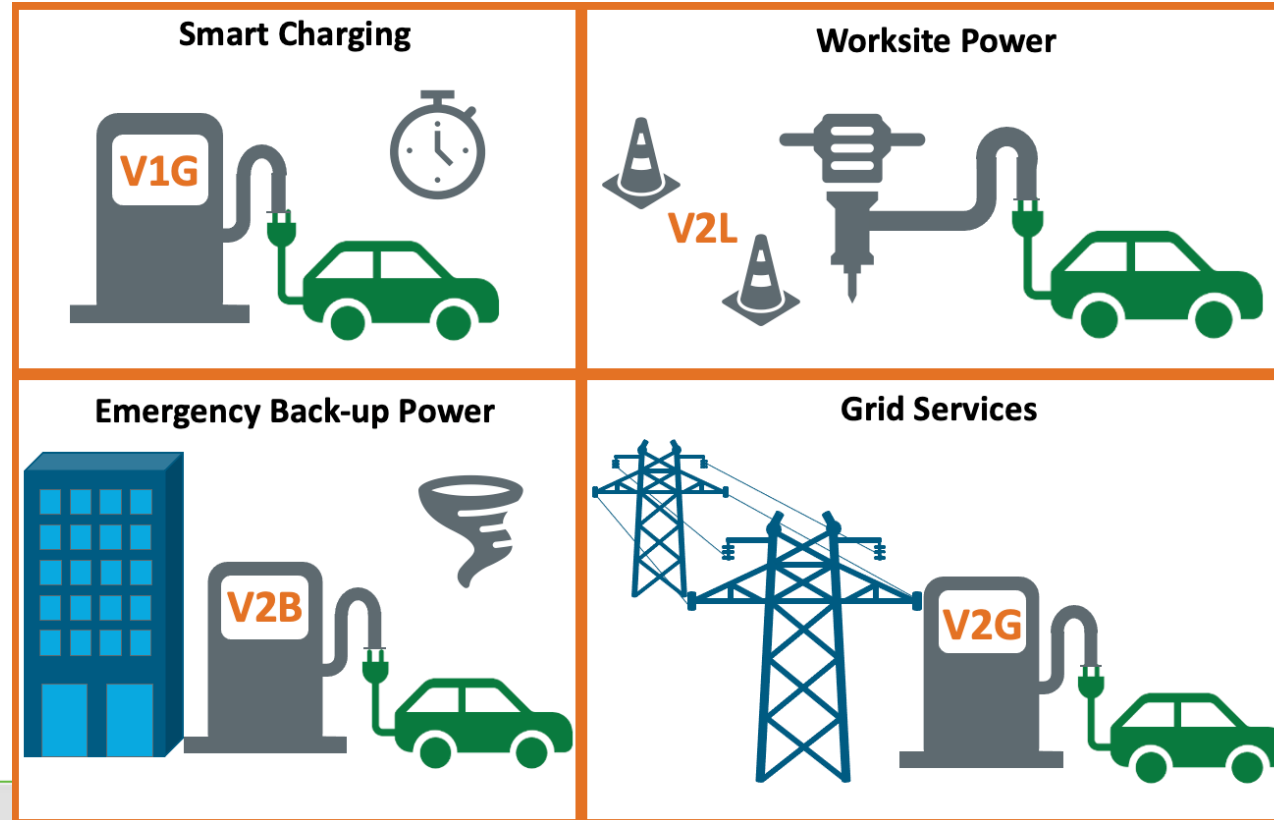
- Take EV stock penetration in a given year (e.g., 9% in 2030)
- Multiply by maximum daily EVSE use (e.g. 55%)
- Results in plans to install EVSE in 5% of parking spaces
- Note: Forecasts vary by forecaster and location (e.g., California)

EV Sales and Stock Forecasts



# EV 'Power' Use Cases to Support Grid Connection

What are the different forms of advanced charging and which of them incorporate bidirectional power



**V1G (Smart Charging)** - EVSE with smart charging features designed to modify charging sessions to mitigate peak demand or respond to grid signals.

**V2L (Worksite Power)** - EVSE or vehicle capable of powering equipment external to the vehicle (typically 2-11 kW).

**V2B (Back-up Power)** - Bidirectional EVSE capable of charging a battery or extracting from battery to power to a building during a grid outage

**V2G (Grid Services)** - Bidirectional EVSE capable of charging a battery or extracting from battery to supply power to the grid and provide grid services.

# VGI Benefits: Plan Ahead for EV Deployment [for fleet]

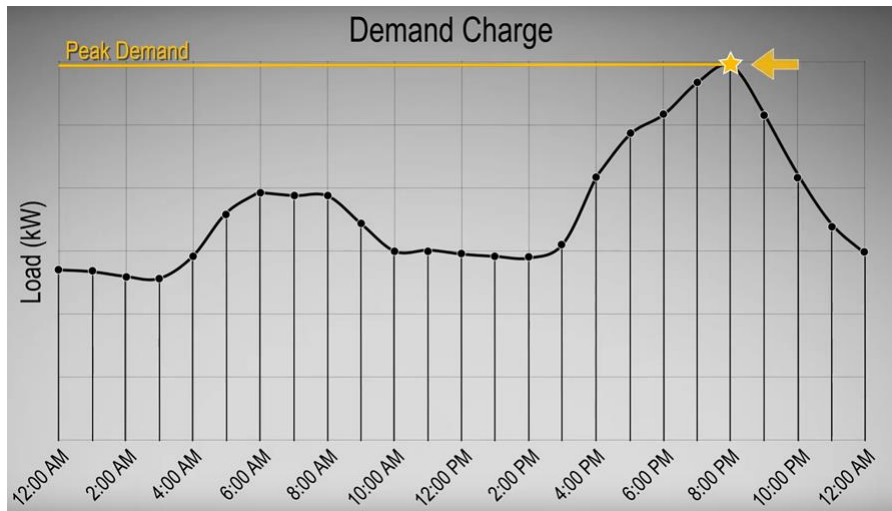
## Managed Charging

- Demand mitigation
  - Reduce system upgrades
  - Minimize peak demand charges
- Management systems
  - Payment
  - Data
- Reduce battery degradation



## Vehicle to Grid

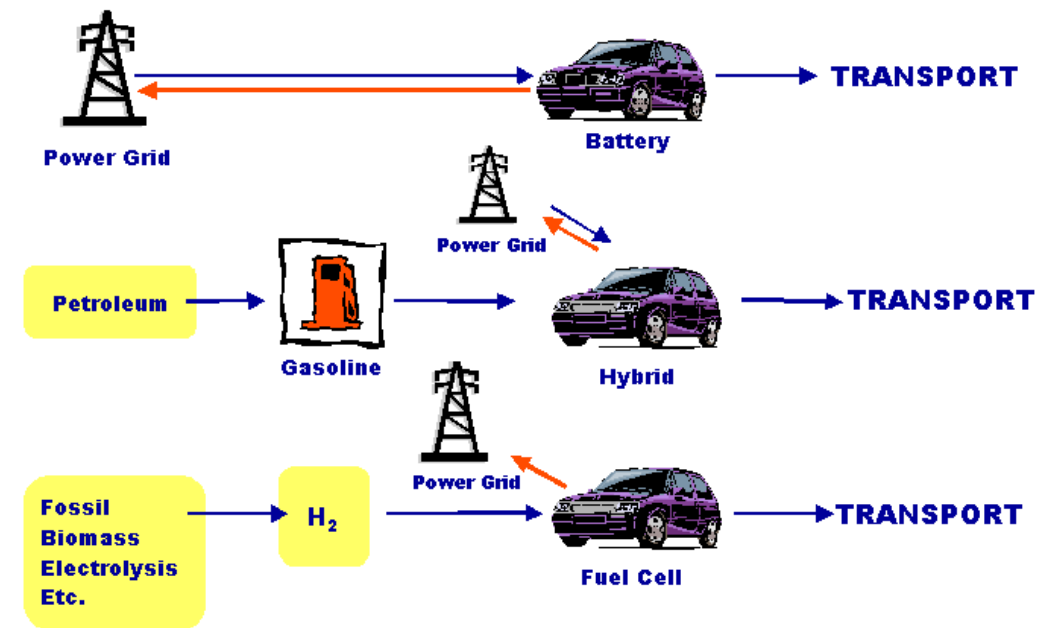
- Two-way power flow
  - Increase system reliability
  - Emergency backup power
  - Particularly valuable in microgrids
- Mobile storage
  - Dispatch local & regional fleets to support impacted facilities
- Grid services
  - Demand response, frequency regulation, and black start services
- Monetize chargers
  - Increase fleet value
  - Aggregator or utility may pay for charger





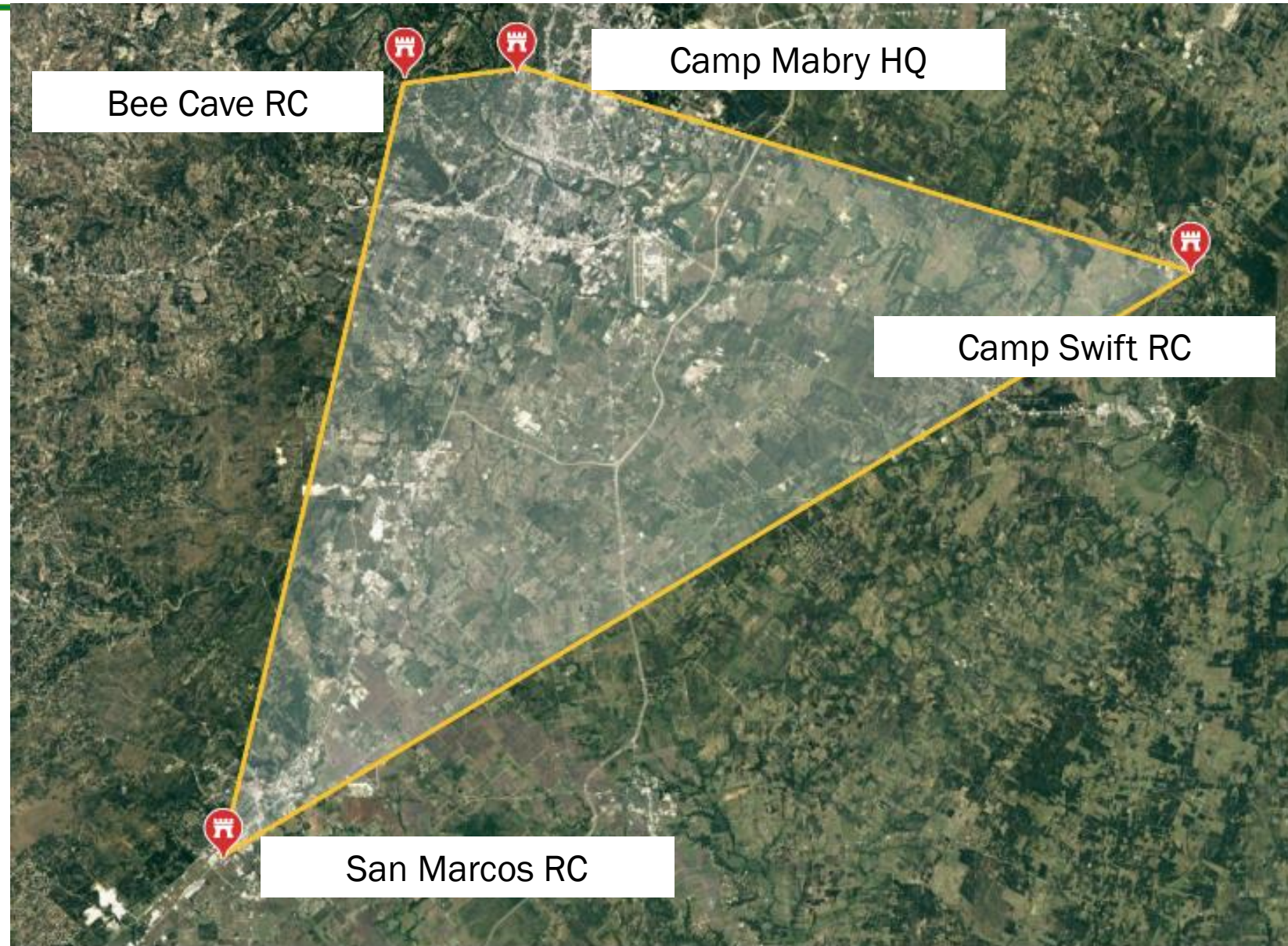
# Example: University of Delaware and PJM

- 2013
  - UD, NRG energy, and PJM
  - UD bidirectional EVs became an official resource of PJM Interconnection
  - Proving for the first time that V2G technology can sell electricity from EVs to the power grid
- Key aspect of the technology
  - Aggregate power from multiple EVs to create one larger power resource
  - Increase grid resilience
  - Providing revenue while the vehicles are parked
- Partnership terms
  - UDel shall have BEVs on-hand if called upon for grid support
  - PJM pays the university market value  
~\$1,200/yr/BEV



# Example: National Guard and EV as Resilience

- National Guard Readiness Centers
- Nontactical vehicles are parked on location during emergencies
- Can provide flexible backup power to individual office buildings with critical power needs
- Regional opportunities to share resilience assets

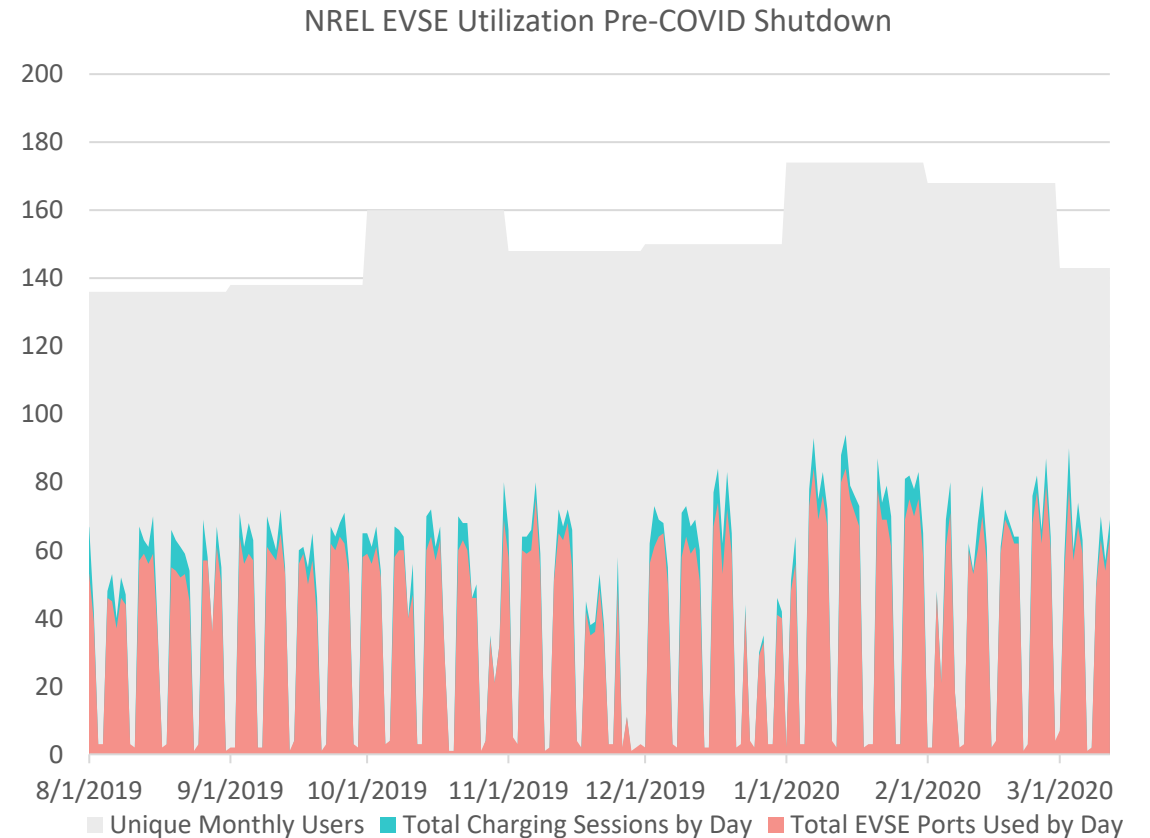


# Example: NREL Managed Charging

## Managed Charging Approach

- Payment Through Mobile Application
- Significant onsite distributed generation and variable lab loads
- Limited electrical capacity (<500 kVA)
- Installed 108 L2 EVSE (>800 kVA)
- Hard capped overall EVSE load instead of installing a new transformer
- Soft capped EV charging load to minimize peak demand
- Users enter number of miles they need and time of departure
- Users compensated with lower rates for flexibility

- EV drivers do not use EVSE daily
- Maximum daily EVSE use/monthly users = 55% in NREL parking garage





# DOE Tool: EV U-Finder

For site with sizable fleet, 1<sup>st</sup> call should be to the utility!

Locate utility contacts who support EVSE deployment

## EV U-Finder: Electric Vehicle Utility Finder

Enter ZIP Code to identify local utilities, electric vehicle support programs, and Clean Cities Coalitions.

92313 Powered by the U.S. Utility Rate Database (<https://openei.org/apps/USURDB/>)  
Utility territories last updated February 2021.  
See Introduction worksheet for notes on using EV U-Finder.



### Identified active utilities in 92313

\*Customer Types:

G: Government or Public; C: Commercial; R: Residential

Utility	Utility Name	Utility Ownership	Known EVSE Funding Eligibility?*	Known Advisory Services Eligibility?*	Known Federal EVSE Incentives?	GSA Areawide Contract?	Identified Utility Contact or Phone Number (as available)	Identified Utility Contact Email
1	Southern California Edison Co	INVESTOR	GC	GC	Y	Y	Customer Service /	<a href="mailto:customer.service@scd.net">customer.service@scd.net</a>
2	City of Colton, California (Utility Company)	PUBLIC	CR	CR			951-261-1111	
3	NA	NA						

### Utility Associations

Utility Ownership	Directory or Contact
INVESTOR	<a href="#">EEI Utility Federal Contacts</a>
PUBLIC	<a href="#">APPA Utility Directory</a>
COOPERATIVE	<a href="#">NRECA Utility Directory</a>
Cooperative Contact	NRECA Federal Coordinator <a href="mailto:cooperative@nreca.org">cooperative@nreca.org</a>

<https://www.eei.org/about/affiliates/nationalkeyaccounts/Pages/Federal-Utility-Directory.aspx>

<https://www.publicpower.org/where-public-power>

<https://www.electric.coop/our-organization/nreca-member-directory>

### State Level Incentives

State:	CA
Known EVSE Funding Eligibility?*	GCR

\*Customer Types: G: Government or Public; C: Commercial; R: Residential

### Clean Cities Coalition

Coalition:	Southern California Clean Cities Coalition
Coordinator:	<a href="#">Jeffrey L. Starnes</a>
email:	<a href="mailto:jstarnes@scag.ca.gov">jstarnes@scag.ca.gov</a>
website:	<a href="http://www.scag.ca.gov/cleancities/">http://www.scag.ca.gov/cleancities/</a>



# DOE/NREL Tool: EVI Locate [DOE, DOD supported]

## Electric Vehicle Infrastructure – Locally Optimized Charging Assessment Tool and Estimator

User-driven web tool with built-in design and cost calculations



# DOE/NREL Tool: EVI Locate [DOE, DOD supported]

1. Drag and drop tool > Users determine where the EVSE goes
2. Siting algorithm plots conduit and conductors
3. National Electrical Code drives electrical upgrade recommendations
4. Sophisticated calculator estimates material, labor, and soft costs



# Engage Now: EVI-LOCATE Opportunities

## Process simplification:

- Guides users through questions
- Users can export designs

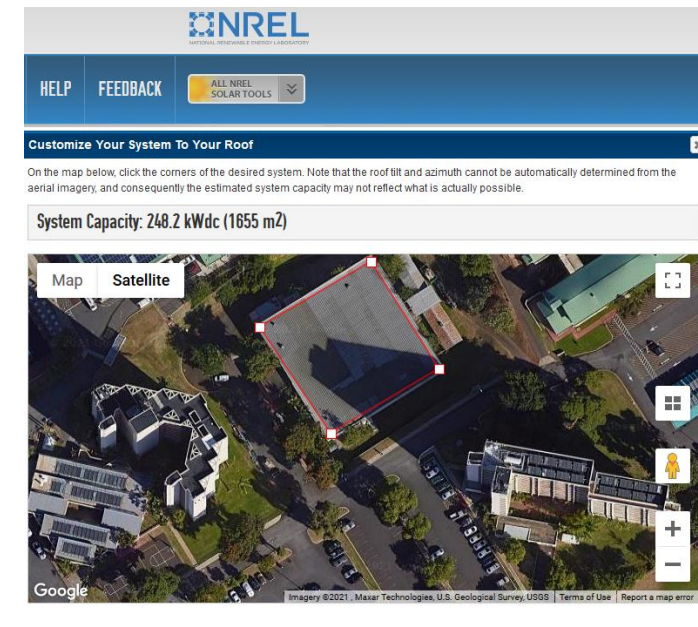
## Embedded calculations:

- Power loads
- National Electrical Code
- Trenching, conduit, conductor distances
- Estimated costs

## Organizational opportunities:

- Track EVSE plans and designs
- Estimate costs by project and campus

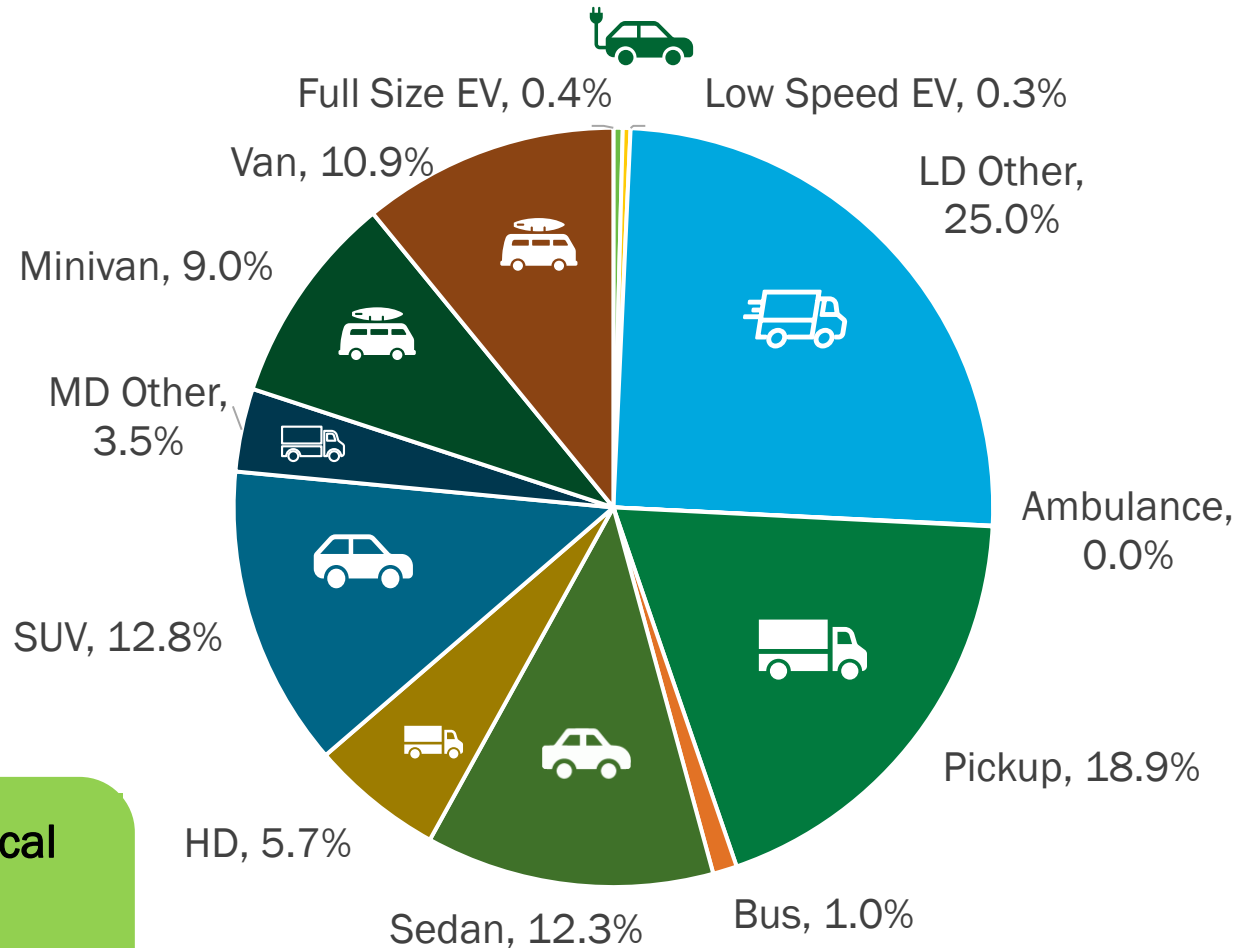
## Similar to PVWatts



Contact [cabell.hodge@nrel.gov](mailto:cabell.hodge@nrel.gov)  
to pilot the tool now

Web release scheduled for May

# Federal Fleet is HUGE... and Everywhere



9% of GSA orders in 2022 were EVs, but most had not arrived as of 9/30/2022

4,674 federal EVSE (electric vehicle supply equipment) charging ports reported in FY22 (up 50% from FY21)

## Federal Non-Tactical Vehicles FY22

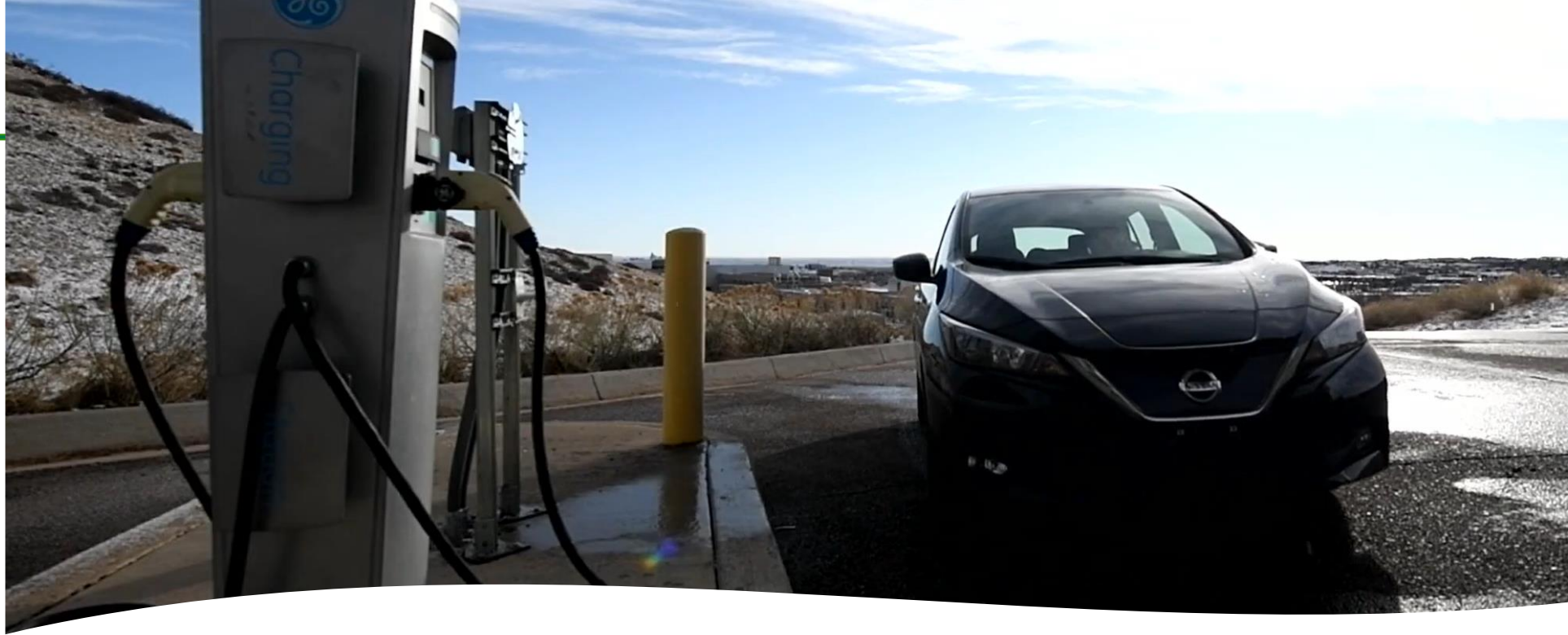
US: 616,218

**MEEA States: 102,794**

Source: Federal Automotive Statistical Tool (FAST), [FAST Login \(inl.gov\)](#)



## Questions... and Thanks!



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