NARUC Electric Vehicles State Working Group

JUNE MEETING –TRANSPORTATION ELECTRIFICATION DATA SHARING SERIES PART 1

JUNE 27, 2023, 3:00- 4:30PM

Welcome

EV SWG Chair

Commissioner Katherine Peretick, Michigan Public Service Commission

EV SWG Vice-Chair

Chair Jason Stanek, Maryland Public Service Commission

NARUC Staff

- Danielle Sass Byrnett, Robert Bennett

Feel free to enter questions into chat at any time

Agenda

3:00 PM	**Welcome and Announcements – Commissioner Katherine Peretick (5 minutes)** • Agenda review • Announcements
3:05 PM	**Chris Irwin, Department of Energy (10 minutes)** • Setting the stage for data innovation.
3:15 PM	**Luke Ackerknecht and Phil Stahlfeld, AlphaGrid (20 minutes)** • Minimum Viable Data for Accelerating EV Charging Deployment
3:35 PM	**Carine Dumit, EVgo (20 minutes)** • How data can help with siting EV chargers and best practices
3:55 PM	**Working Group Peer Sharing (35 minutes)**
4:30 PM	**Adjourn**

Event Announcements

- **July 13-14, 2023, National NEVI Conference**, hosted by NASEO and AASHTO in Arlington, VA. The conference will equip states with the tools they need to build out a national EV charging network that is convenient, reliable, affordable, accessible, and equitable. The meeting will convene officials from state and federal agencies, as well as representatives from utilities and private-sector partners to:

  More information including registration information can be found here: https://www.naseo.org/event?EventID=8413. ***NARUC can provide limited travel support and stipends for Commissioners and their staff.***
- **July 16–19, 2023, The NARUC Summer Policy Summit** is coming up in Austin, Texas. It will feature at least four sessions on EVs:

  Registration is now open and is discounted through May 31.

Event Announcements Part 2

NARUC is excited to **announce the Summer Policy Summit will have a tour of Tesla's EV Giga Factory on Tuesday, July 18th from 4:45- 6:45pm**. This is a unique opportunity to see how Tesla's electric vehicles are manufactured. Spaces are limited and only available to NARUC members --- with a priority given to NARUC's EV State Working Group members, followed by Energy Resources and Environment Committee/Staff Subcommittee members and the Electricity Committee/Staff Subcommittee members. Transportation to the factory and refreshments will be provided. **Register for the tour ASAP to claim your spot.**

Welcome

Moderator: **Commissioner Katherine Peretick, Michigan Public Service Commission**

Guest Speakers

- Chris Irwin, Department of Energy
- Luke Ackerknecht and Phil Stahlfeld, AlphaGrid
- Carine Dumit, EVgo

alpha grid

Minimum Viable Data for Accelerating EV Charging Deployment

NARUC EVSWG, June 27th 2023

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Team

We worked together at Google X's moonshot for the electric grid and founded Alpha Grid to help accelerate clean energy infrastructure deployment.

Phil Stahlfeld

Co-Founder (CTO)

- Previous Staff Eng Lead, AI/ML at Google X
- Early Software Engineer at Tapestry
- Former Google Brain Ninja
- B.S. in Computer Science @ Bucknell

Luke Ackerknecht

Co-Founder (CEO)

- Previous Product Lead, AI/ML at Google X
- Former ML Engineer at Google, Nest, Energy Trader
- M.S. in Computer Science @ Georgia Tech
- B.S. and MPA in Energy Economics @ Cornell

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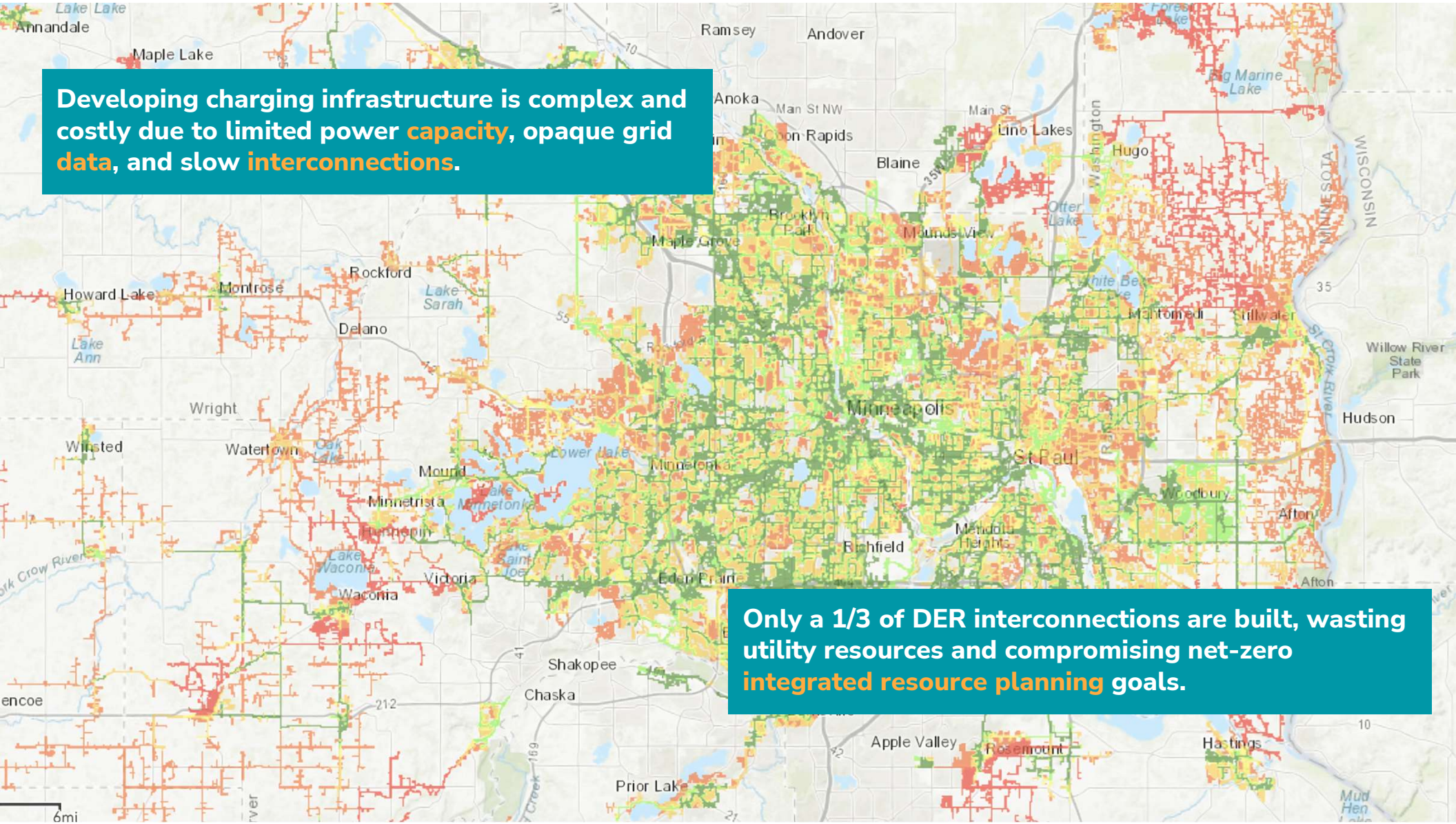

Developing charging infrastructure is complex and costly due to limited power capacity, opaque grid data, and slow interconnections.
Only a 1/3 of DER interconnections are built, wasting utility resources and compromising net-zero integrated resource planning goals.
Annandale
Maple Lake
Ramsey
Andover
Anoka
Coon Rapids
Blaine
Lino Lakes
Hugo
Big Marine Lake
Otter Lake
Maple Grove
Brooklyn Park
Maounds View
Howard Lake
Montrose
Rockford
Lake Sarah
Delano
Lake Ann
Wright
Minneapolis
St Paul
Hudson
Willow River State Park
Winsted
Watertown
Mound
Minnetrista
Lake Minnetonka
Minnetonka
Woodbury
Afton
Richfield
Victoria
Waconia
Eden Prairie
Shakopee
Chaska
Apple Valley
Rosemount
Hastings
Prior Lake
6mi

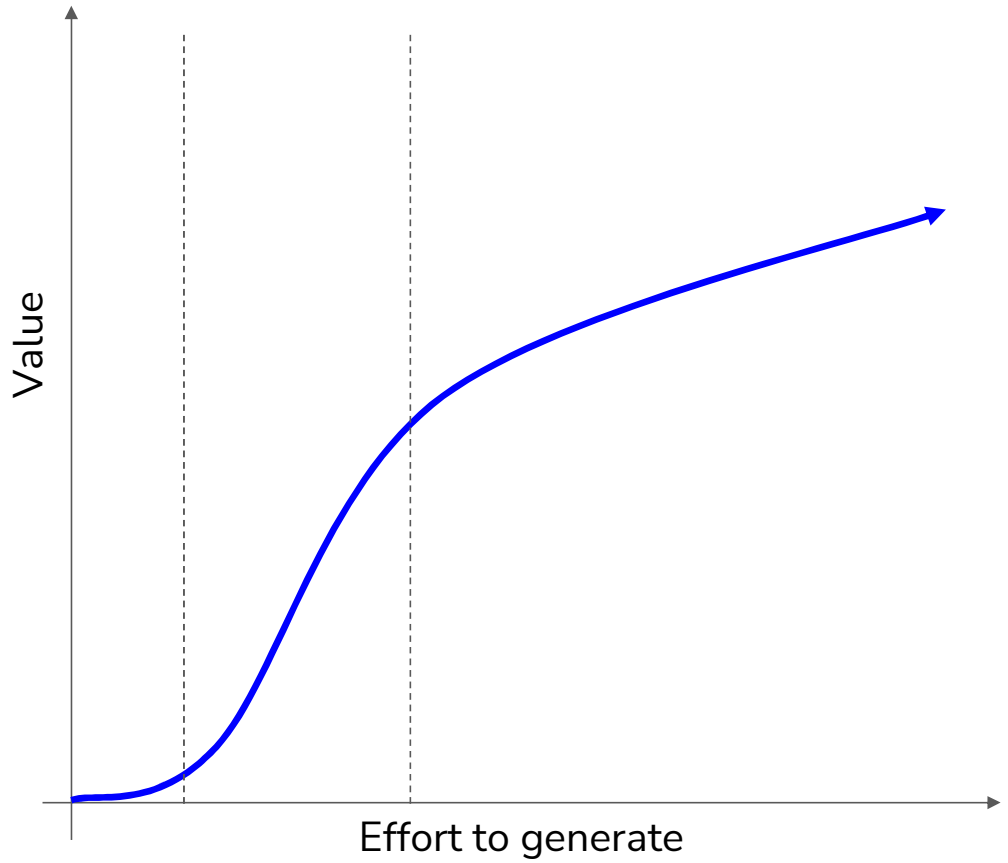
Minimum Viable...Data? (MVD)

Focus on the right data for the right use cases

California's **integrated capacity analysis** (ICA) generates maximum load and generation capacity values per line segment, per month of year, per hour of day, per loading scenario.

Unfortunately, the developers don't make use of this data because it is:

- Inaccurate
- Out of date
- Hard to access
- Indirectly related to their business goals



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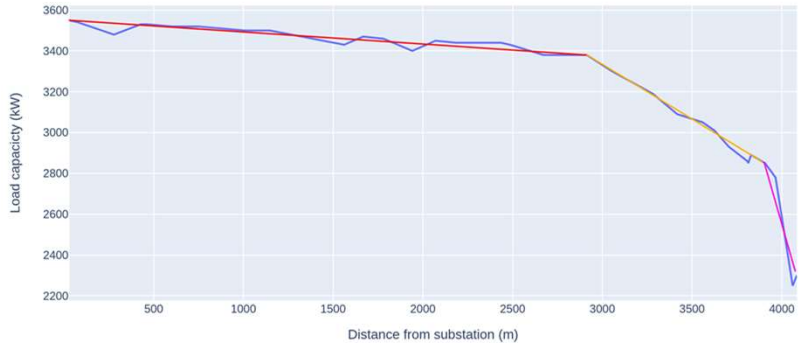
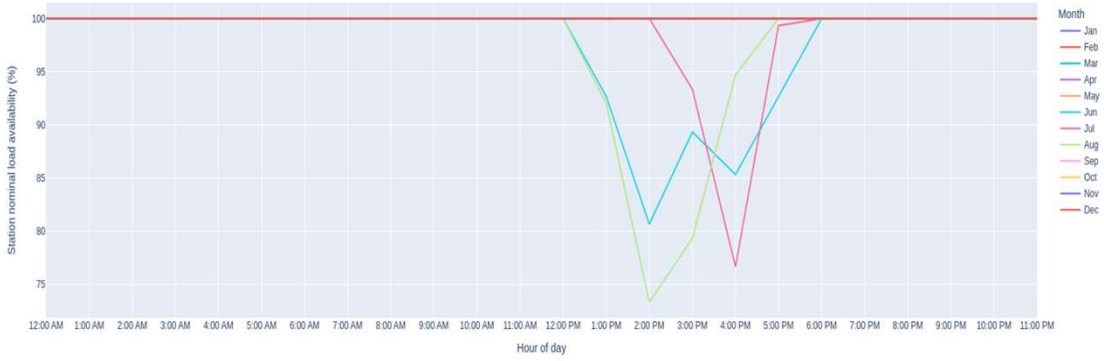
Minimum Viable...Data? (MVD)

Utilities can accelerate grid innovation by sharing ‘minimum viable data’ with developers



With **line level** analysis we can estimate grid **upgrade costs**



With **time variant** analysis we can calculate battery size for **peak shaving**

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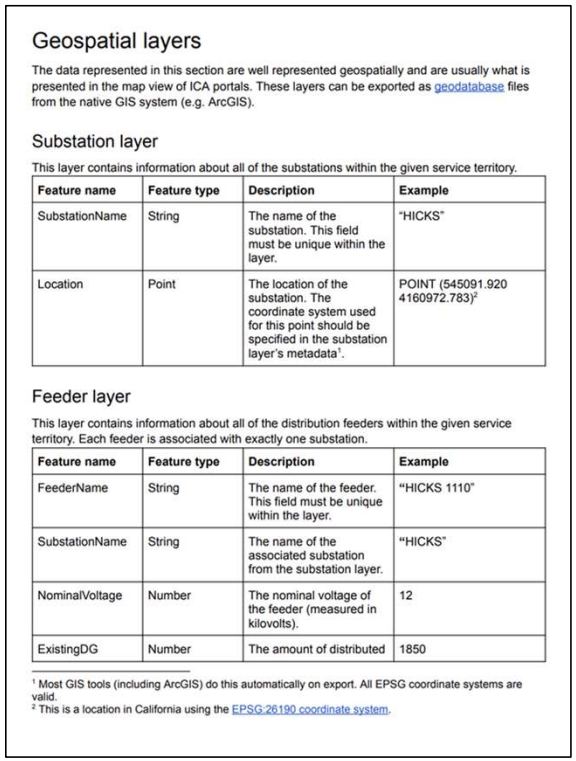
Minimum Viable...Data? (MVD)

Alpha Grid wrote a data requirements specification for EV charging infrastructure siting



Geospatial layers

The data represented in this section are well represented geospatially and are usually what is presented in the map view of ICA portals. These layers can be exported as geodatabase files from the native GIS system (e.g. ArcGIS).

Substation layer

This layer contains information about all of the substations within the given service territory.

Feature name	Feature type	Description	Example
SubstationName	String	The name of the substation. This field must be unique within the layer.	"HICKS"
Location	Point	The location of the substation. The coordinate system used for this point should be specified in the substation layer's metadata[1].	POINT (545091.920 4160972.783)[2]

Feeder layer

This layer contains information about all of the distribution feeders within the given service territory. Each feeder is associated with exactly one substation.

Feature name	Feature type	Description	Example
FeederName	String	The name of the feeder. This field must be unique within the layer.	"HICKS 1110"
SubstationName	String	The name of the associated substation from the substation layer.	"HICKS"
NominalVoltage	Number	The nominal voltage of the feeder (measured in kilovolts).	12
ExistingDG	Number	The amount of distributed	1850

[1] Most GIS tools (including ArcGIS) do this automatically on export. All EPSG coordinate systems are valid.
[2] This is a location in California using the EPSG:26190 coordinate system.

EV siting data requirements

Geospatial Layers

- Substation
- Feeder
- Line

Capacity Data Layer

- Generation Analysis @line-level
- Load Analysis @line-level
- (Planned) System Upgrades @feeder-level

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Utilities should frequently update hosting capacity values as the grid changes

Cloud computing and better algorithm design can radically reduce costs to enable weekly or daily updates

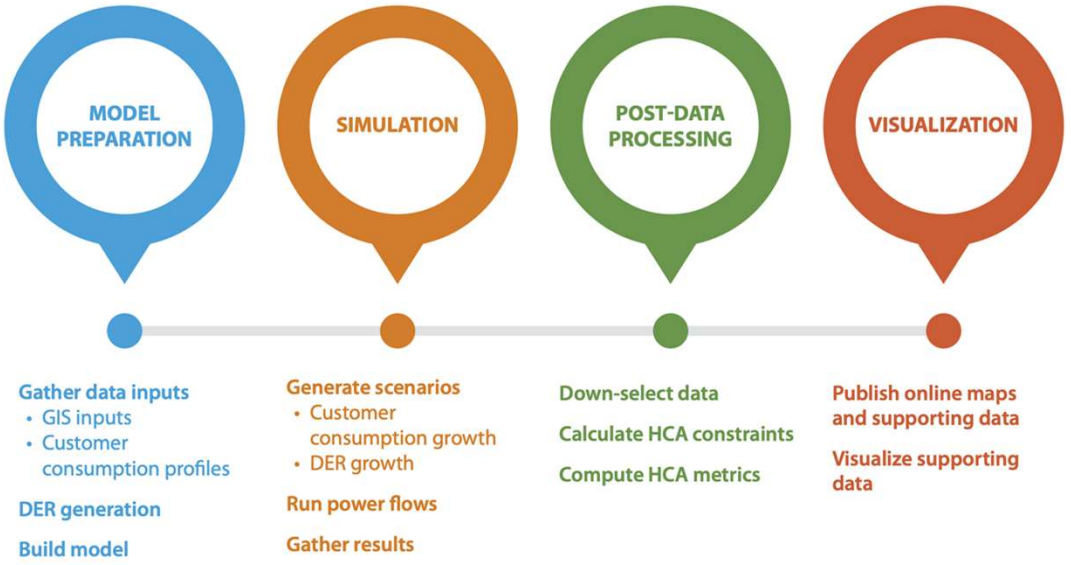

Figure 1. Steps in an HCA. *Illustration by Nicole Leon, NREL*

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Table 1: Cost Estimates Comparison of Multiple ICA Implementation Scenarios

Iterative	Cost ($000) (Year 1)		Cost ($000) (Beyond Year 1)	
Scenario 1: 96 loading conditions, monthly updates ICA WG Iterative Methodology base case	**PG&E**	$2,040-$3,800	**PG&E**	$1,740-$3,050
	SCE	$3,300-$6,300	**SCE**	$1,400-$2,600
	SDG&E	$2,200-$3,300	**SDG&E**	$1,100-$1,700
Scenario 2: 576 loading conditions, monthly updates	**PG&E**	$2,990 - $5,300	**PG&E**	$2,690 - $4,550
	SCE	$3,800-$7,000	**SCE**	$2,200-$3,900
	SDG&E	$2,400-$3,500	**SDG&E**	$1,500-$2,200
Scenario 3: 96 loading conditions, weekly updates	**PG&E**	$4,130-$7,100	**PG&E**	$3,830-$6,350
	SCE	$4,300-$8,100	**SCE**	$2,900-$5,200
	SDG&E	$3,100-$4,700	**SDG&E**	$2,200-$3,300
Streamlined	**Cost ($000) (Year 1)**		**Cost ($000) (Beyond Year 1)**	
Scenario 1: 8760 loading conditions, annual updates ICA WG Streamlined Methodology base case	**PG&E**	$1,480-$3,060	**PG&E**	$680-$1,560
	SCE	$2,000-$3,600	**SCE**	$600-$1,400
	SDG&E	$1,700-$2,500	**SDG&E**	$600-$900
Scenario 2: 8760 loading conditions, monthly updates	**PG&E**	$1,630-$3,360	**PG&E**	$830-$1,860
	SCE	$2,000-$3,600	**SCE**	$1,100-$2,100
	SDG&E	$1,700-$2,500	**SDG&E**	$900-$1,400
Scenario 3: 8760 loading conditions, weekly updates	**PG&E**	$1,810-$3,720	**PG&E**	$1,160-$2,470
	SCE	$3,300-$5,900	**SCE**	$1,700-$3,200
	SDG&E	$2,300-$3,500	**SDG&E**	$1,500-$2,200

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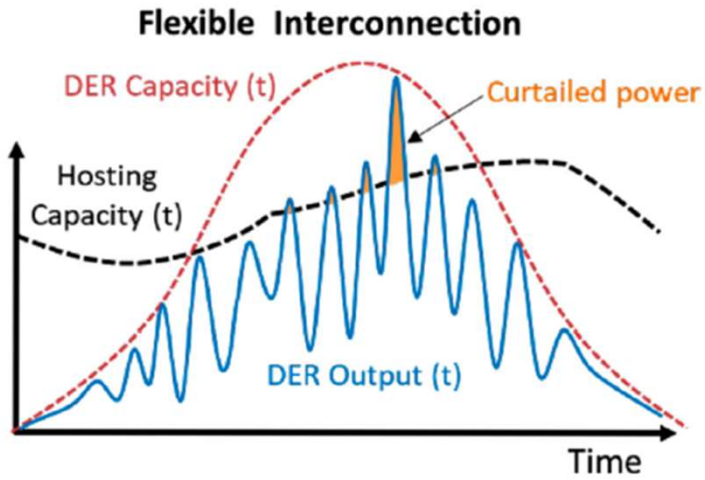
Better data enables flexible interconnections, especially for load-only resources

More detailed capacity analysis can help unlock underutilized capacity for EV charging and storage



10 MW Battery Storage Case Study

System impact study required ~$1.5M in grid upgrades to install a battery restriction scheme.

Alpha Grid demonstrated that a flexible interconnection would save 84% ($1.3M) in grid upgrade costs and improve battery performance.

Data Used

- Feeder GIS
- Historical feeder load
- Substation bank load capacity
- Feeder circuit breaker load capacity

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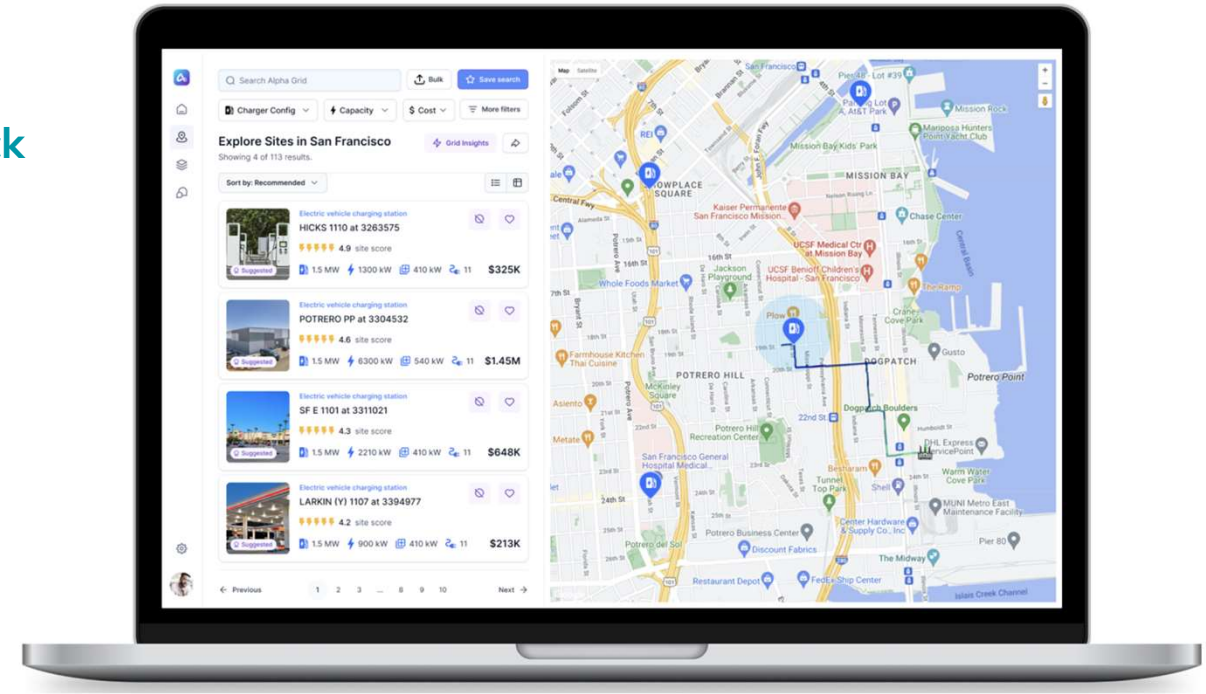
Better data enables developer-focused products and services ecosystem

Right-sizing and siting projects the first time helps utilities and developers optimize project planning

Quickly qualify leads and unlock site profitability in one-click.

- ✓ Site Search & Feasibility Analysis
- ✓ Fleet Planning
- ✓ Flexible Interconnections

Deploy right-sized and scaleable EV charging infrastructure the first time.



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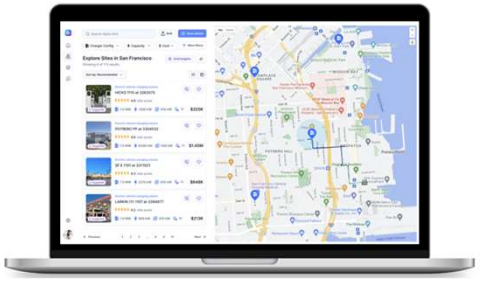
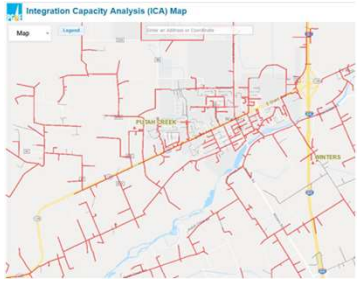
Alpha Grid is looking for innovation pilot partnerships

We want to unlock an ecosystem of faster & flexible interconnections and better developer tools for everyone



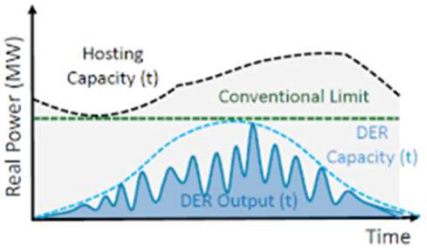
Developer Portal

- 👍 Developers want to find sites with enough power capacity.
- 👎 Grid data is unorganized and 63% of interconnections fail with 330 day avg. cycle time.
- ☑ We can increase conversion rates by right-siting and sizing.



Hosting Capacity Simulation

- 👍 Developers want weekly or monthly updates.
- 👎 Costs $2.5M-4.5M/yr for *monthly* updates.
- ☑ We can simulate *daily* updates for 10X less.



Flexible Interconnection

- 👍 Developer wants to avoid grid upgrades.
- 👎 Interconnection is sized for worst-case events.
- ☑ We can build a controller for load-only charging + storage, streamlining interconnection.

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Our Vision

A single platform that integrates data from utilities and other sources to provide unparalleled grid visibility and accelerate charging infrastructure deployment.

Electric Utilities

We **enhance utility data**, **automate** complex studies, predict **upgrades**, and increase the chance that regulators approve their **rate cases.**

Energy Developers

We help developers **avoid expensive upgrades**, suggest **design changes**, and **simplify RFP** submissions for each project.

Grid Transparency
Leads Qualification
Automated Interconnections

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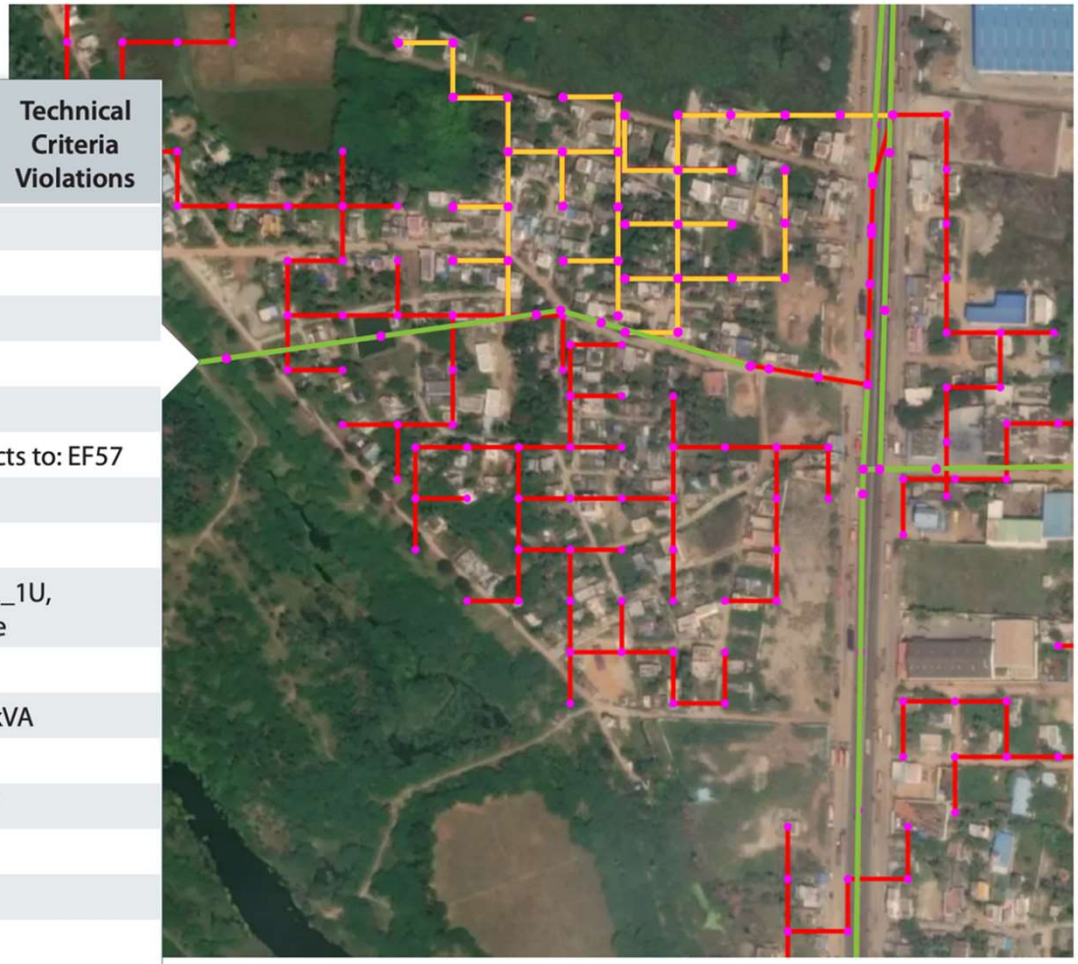
Line Section	Substation	Load Profile	Technical Criteria Violations
Section ID: 148104500			
Hosting Capacity: 5,000 kW			
Feeder ID: 23			
Feeder voltage: 12.47			
Number of phases: 3			
Which substation transformer the feeder connects to: EF57			
Feeder type: radial			
Feeder length: 6.213 miles			
Feeder conductor size and impedance: 1000_AL_1U, R1=0.517416 ohm/mile, X1= 0.267376 ohm/mile			
Service transformer rating: 100kVA			
Service transformer daytime minimum load: 35kVA			
Existing generation (weekly refresh rate): 50 kW			
Queued generation (weekly refresh rate): 20 kW			
Total generation (weekly refresh rate): 70 kW			
Currently scheduled upgrades: No			
Federal or state jurisdiction: State			



HCA map example by NREL

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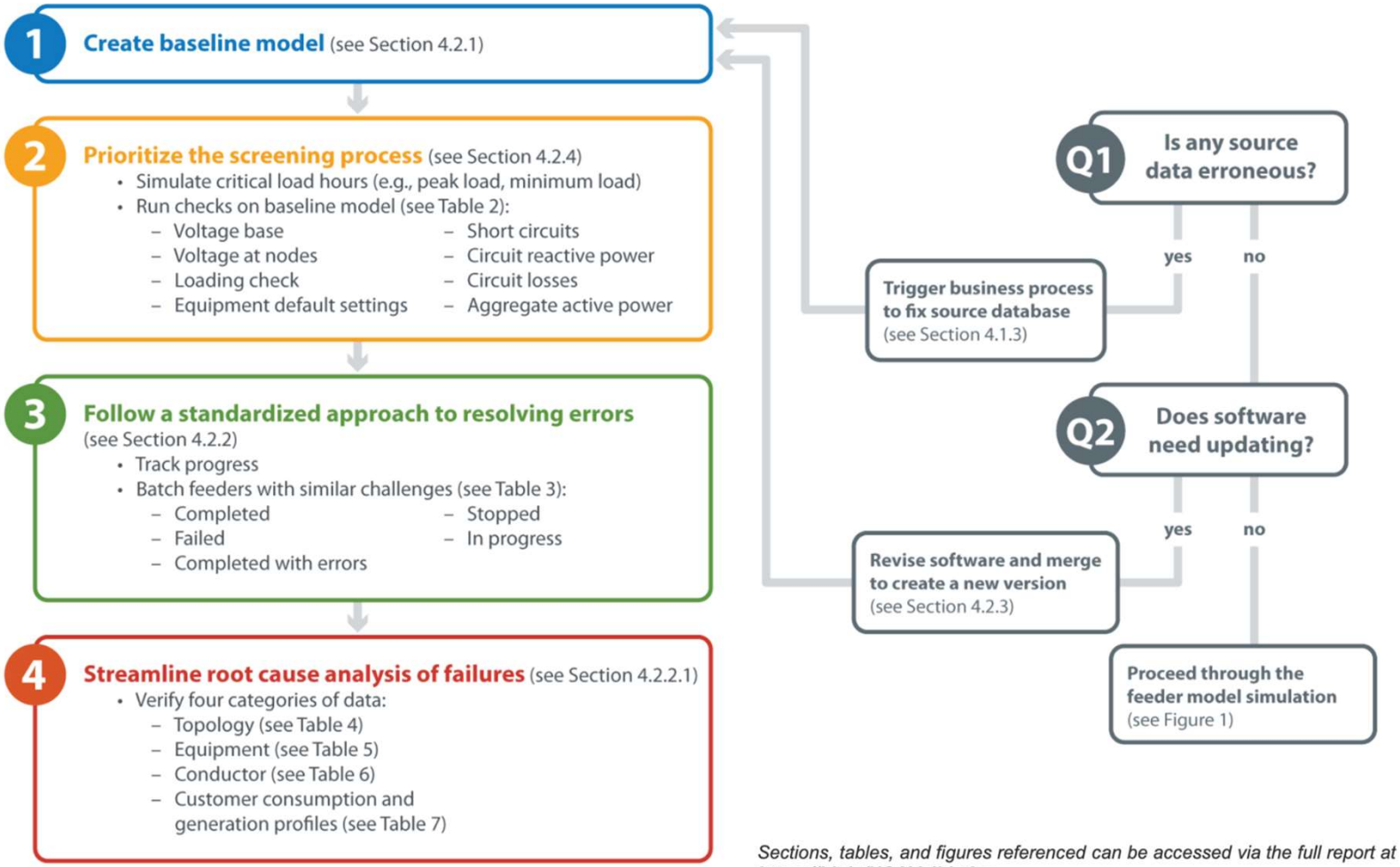

Sections, tables, and figures referenced can be accessed via the full report at ***https://bit.ly/HCAValidation***

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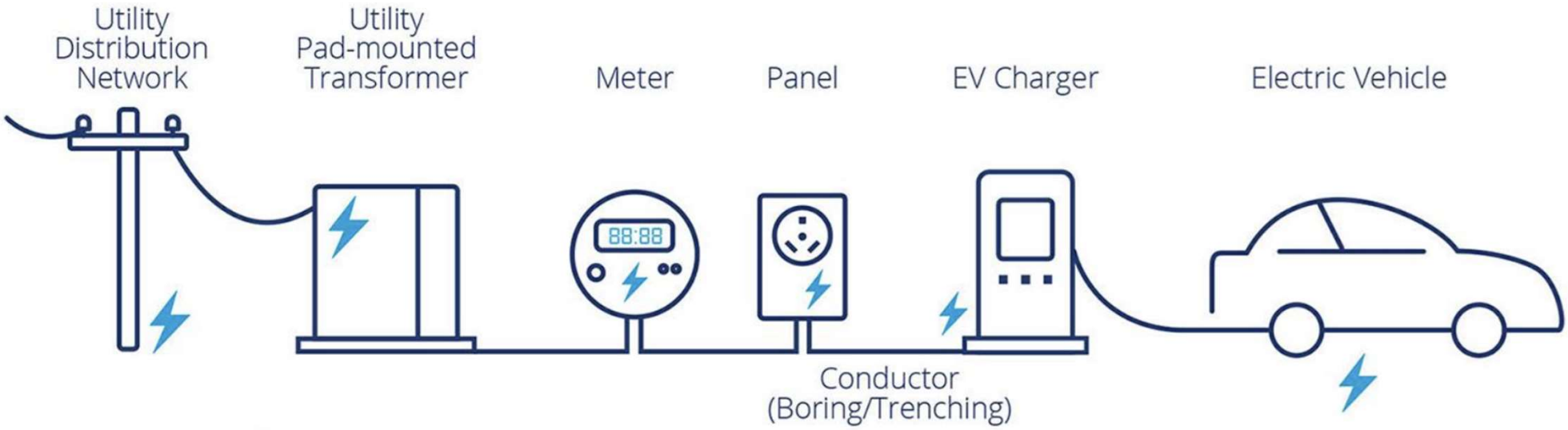

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NARUC EV State Working Group
Data Innovation

June 27, 2023

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AGENDA

- Overview of EVgo
- Hosting Capacity Maps and Data: Objectives and Benefits
- Examples: Need to have and Nice to have
- Gold Standard

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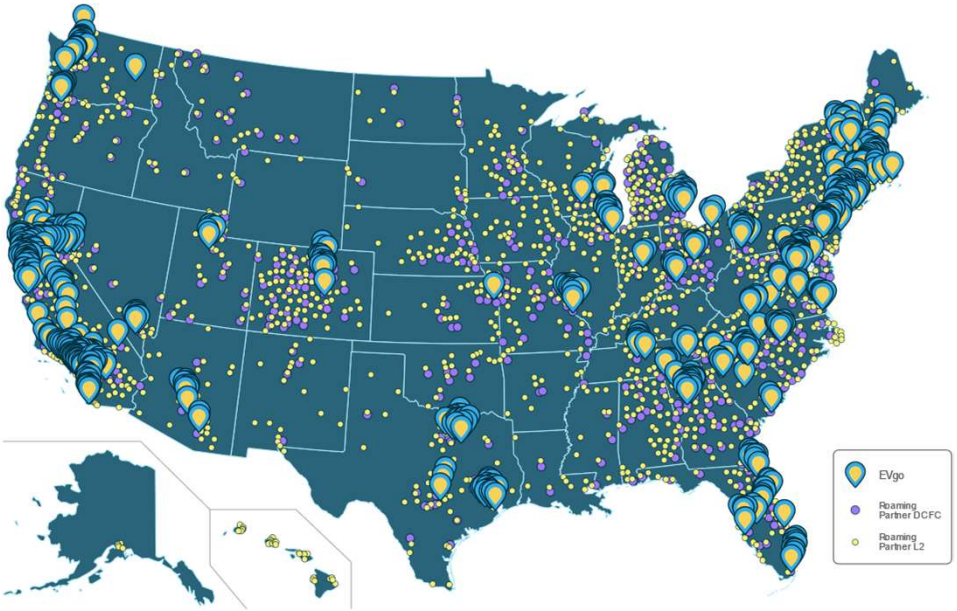
EVgo IS ONE OF THE NATION'S LARGEST PUBLIC EV FAST CHARGING NETWORKS



900+ stations in 60+ cities across 30+ states

Reliable
Committed to best-in-class uptime

100% Renewable
Through the purchase of renewable energy certificates

140 Million
People in the U.S. live within 10 miles of an EVgo station

614,000+
Customer accounts and growing

EV Compatibility
Serves all fast-charging standards – including Tesla

Drivers Love Us
High customer scores on PlugShare

EVgo's Partners Include:

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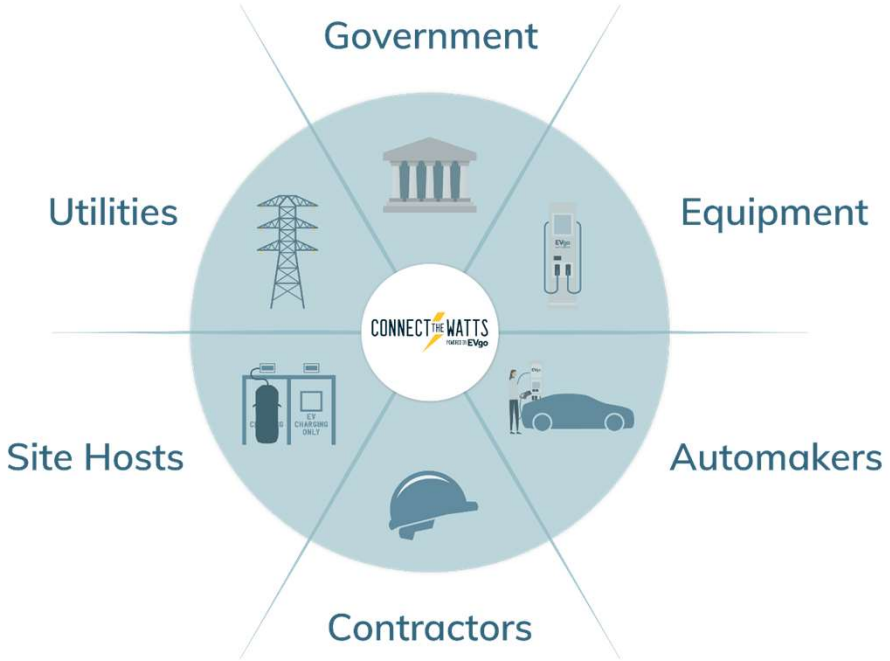
CONNECT THE WATTS™
POWERED BY EVgo



The EV Charging Ecosystem

- **Bringing electric vehicle charging infrastructure community together to identify best practices for charger deployment**

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Objectives and Benefits

- Informative rather than prescriptive
- Ease prospecting and evaluation of the potential and cost of interconnecting EV charging infrastructure at specific locations
- Assess available transformer loading capability and estimate interconnection risk and cost
- Rule out circuits unable to accommodate DCFC
- Foster collaboration and partnership
- Integrate EV charging infrastructure loads more efficiently, quickly, and cost-effectively.

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Examples

Need to have

- Color-coded maps provide initial indication of loading capacity headroom by circuit
- Transformer | Circuit| Substation Load
- Circuit DCFC loading capacity | Voltage level | Phase | Amps rating
- Underground or overhead circuit

Nice to have

- EVSE interconnection queue by substation
- System upgrades
- Forecasted grid hardening investments
- Frequent updates to ensure accuracy

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Gold Standard

- **California PUC**
  - High DER Grid Planning Proceeding Overview (2021–2024)
  - Integration Capacity Analysis (ICA)
  - Maps are designed to assist developers find information on the grid where capacity is available to site DER
- **Los Angeles Department of Water and Power**
  - Power Capacity Map: Provides customers with insight about the available load capacity throughout the City of Los Angeles.
- **ConEdison, New York**
  - Hosting Capacity Web Application: Network Hosting Capacity, EV Charging Capacity

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Thank You!

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  - Director - Market Development and Public Policy
  - carine.dumit@evgo.com

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Peer Sharing

- **Peer sharing question for the EVSWG**: Are any innovative analyses of utility data happening in your state?
  - Next EV State Working Group meeting: Roundtable on utility / EV charger data sharing on July 25.

All working group members are invited to share about their state

Next EV SWG meeting: Tues, July 25th, 3:00 – 4:30pm

WWW.NARUC.ORG/CPI-1/ENERGY-INFRASTRUCTURE-MODERNIZATION/ELECTRIC-VEHICLES/

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**