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
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 PM</td>
<td>Welcome and Announcements – Commissioner Katherine Peretick (5 minutes)</td>
</tr>
<tr>
<td></td>
<td>• Agenda review</td>
</tr>
<tr>
<td></td>
<td>• Announcements</td>
</tr>
<tr>
<td>3:05 PM</td>
<td>Chris Irwin, Department of Energy (10 minutes)</td>
</tr>
<tr>
<td></td>
<td>• Setting the stage for data innovation.</td>
</tr>
<tr>
<td>3:15 PM</td>
<td>Luke Ackerknecht and Phil Stahlfeld, AlphaGrid (20 minutes)</td>
</tr>
<tr>
<td></td>
<td>• Minimum Viable Data for Accelerating EV Charging Deployment</td>
</tr>
<tr>
<td>3:35 PM</td>
<td>Carine Dumit, EVgo (20 minutes)</td>
</tr>
<tr>
<td></td>
<td>• How data can help with siting EV chargers and best practices</td>
</tr>
<tr>
<td>3:55 PM</td>
<td>Working Group Peer Sharing (35 minutes)</td>
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<tr>
<td>4:30 PM</td>
<td>Adjourn</td>
</tr>
</tbody>
</table>
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](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](https://www.narec.org/rwc/event) and is discounted through May 31.
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
Minimum Viable Data for Accelerating EV Charging Deployment

NARUC EVSWG, June 27th 2023
Team

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

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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
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.
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
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

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**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. Each substation is associated with exactly one substation.

<table>
<thead>
<tr>
<th>Feature name</th>
<th>Feature type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substation Name</td>
<td>String</td>
<td>The name of the substation. This field must be unique within the layer.</td>
<td>&quot;HICKS&quot;</td>
</tr>
<tr>
<td>Location</td>
<td>Point</td>
<td>The location of the substation. The coordinate system used for this point should be specified in the substation layer's metadata.</td>
<td>POINT (240891.823 416507.783)</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Feature name</th>
<th>Feature type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder Name</td>
<td>String</td>
<td>The name of the feeder. This field must be unique within the layer.</td>
<td>&quot;HICKS 1110&quot;</td>
</tr>
<tr>
<td>Substation Name</td>
<td>String</td>
<td>The name of the associated substation from the substation layer.</td>
<td>&quot;HICKS&quot;</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>Number</td>
<td>The nominal voltage of the feeder (measured in kilovolts).</td>
<td>12</td>
</tr>
<tr>
<td>Existing DG</td>
<td>Number</td>
<td>The amount of distributed kilowatts.</td>
<td>1550</td>
</tr>
</tbody>
</table>

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 26916 coordinate system.

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**Geospatial Layers**
- Substation
- Feeder
- Line

**Capacity Data Layer**
- Generation Analysis @line-level
- Load Analysis @line-level
- (Planned) System Upgrades @feeder-level
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 Leen, NREL.
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
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.
Our Vision

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

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**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**
### Line Section

<table>
<thead>
<tr>
<th>Substation</th>
<th>Load Profile</th>
<th>Technical Criteria Violations</th>
</tr>
</thead>
</table>

**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, \( R_1 = 0.517416 \text{ ohm/mile}, X_1 = 0.267376 \text{ ohm/mile} \)  
**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

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1. **Create baseline model** (see Section 4.2.1)

2. **Prioritize the screening process** (see Section 4.2.4)
   - Simulate critical load hours (e.g., peak load, minimum load)
   - Run checks on baseline model (see Table 2):
     - Voltage base
     - Voltage at nodes
     - Loading check
     - Equipment default settings
   - Short circuits
   - Circuit reactive power
   - Circuit losses
   - Aggregate active power

3. **Follow a standardized approach to resolving errors** (see Section 4.2.2)
   - Track progress
   - Batch feeders with similar challenges (see Table 3):
     - Completed
     - Failed
     - Completed with errors
   - Stopped
   - In progress

4. **Streamline root cause analysis of failures** (see Section 4.2.2.1)
   - Verify four categories of data:
     - Topology (see Table 4)
     - Equipment (see Table 5)
     - Conductor (see Table 6)
     - Customer consumption and generation profiles (see Table 7)

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

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NARUC EV State Working Group
Data Innovation
June 27, 2023
AGENDA

► Overview of EVgo
► Hosting Capacity Maps and Data: Objectives and Benefits
► Examples: Need to have and Nice to have
► Gold Standard
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:
Bringing electric vehicle charging infrastructure community together to identify best practices for charger deployment
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.
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
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
Thank You!

► Carine Dumit
  ► Director - Market Development and Public Policy
  ► carine.dumit@evgo.com
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](http://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/](http://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