

DOCKETED

Docket Number:	19-AB-2127
Project Title:	Implementation of AB 2127 Electric Vehicle Charging Infrastructure Assessments
TN #:	252774
Document Title:	EVSE Deployment and Grid Evaluation (EDGE) Workshop Slides
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EVSE Deployment and Grid Evaluation (EDGE) Tool

Presenter: Micah Wofford, Vehicle-Grid Integration Unit, Fuels and Transportation Division

Date: October 26, 2023



Housekeeping

- Workshop is being recorded

- Workshop Event Webpage:

<https://www.energy.ca.gov/event/workshop/2023-10/evse-deployment-and-grid-evaluation-edge-tool-workshop>

- Written Comments to Docket # 19-AB-2127:

<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=19-AB-2127>

Deadline for Written Comments: Wednesday, November 8, 2023 by 5 pm



Commitment to Diversity

The CEC adopted a resolution strengthening its commitment to diversity in our funding programs. The CEC continues to encourage disadvantaged and underrepresented businesses and communities to engage in and benefit from our many programs.

To meet this comment, CEC staff conducts outreach efforts and activities to:

- Engage with disadvantaged and underrepresented groups throughout the state;
- Notify potential new applicants about the CEC's funding opportunities;
- Assist applicants in understanding how to apply for funding from the CEC's programs;
- Survey participants to measure progress in diversity outreach efforts



Diversity Survey



Scan the code on a phone or tablet with a QR reader to access the survey.

One Minute Survey

The information supplied will be used for public reporting purposes to display anonymous overall attendance demographics

Zoom Participants, please use the link in the chat to access the survey or scan the QR code on the left of the screen with a phone or tablet to access the survey

Survey will be closed at the end of the day

Survey Link:

<https://forms.office.com/g/b86LAyn4tW>



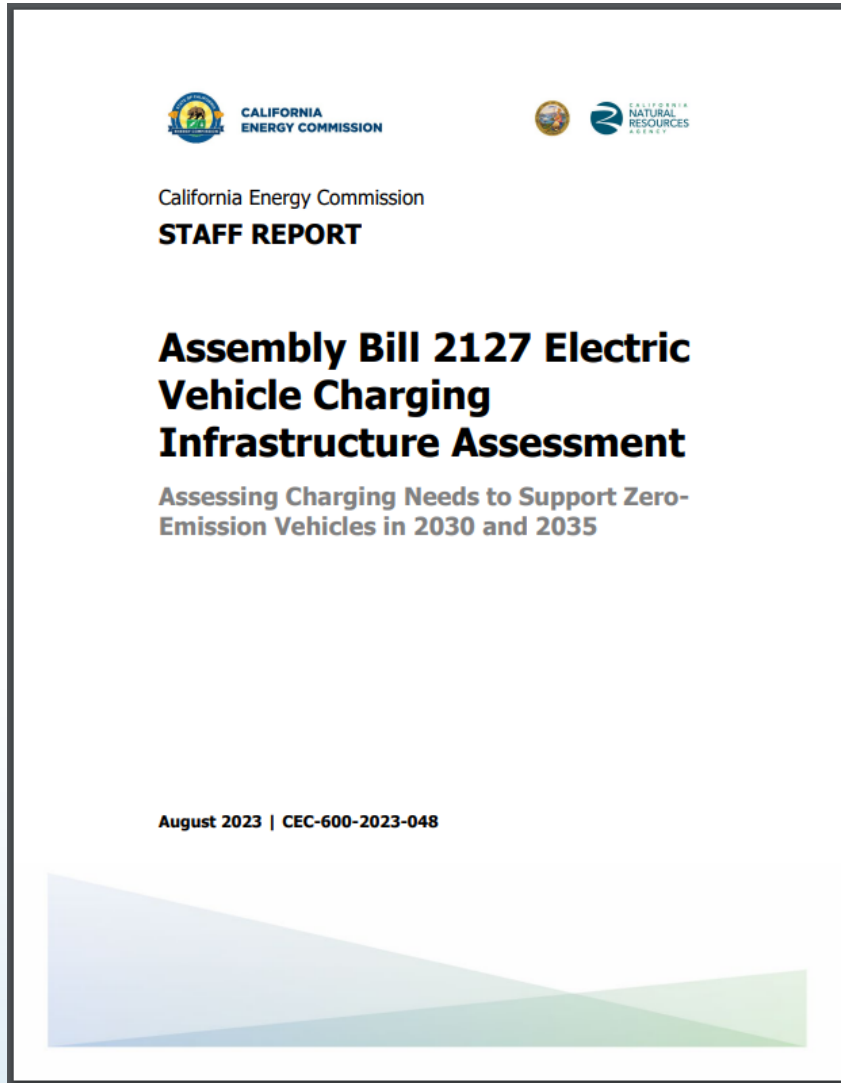
Workshop Agenda

- Staff presentation on the EDGE tool detailing design, methodology, and functionality including a demonstration of the tool – **(Approx. 40 minutes)**
- Public Q&A and comment period – **(Approx. 30+ minutes)**



Background and Context

- [Assembly Bill 2127 \(Ting, 2018\)](#)
 - Assess charging infrastructure needed to meet the state's zero-emission vehicle goals through 2030
 - Expanded by [Executive Order N-79-20](#) with higher targets through 2035
 - Need to identify locations in California that can sufficiently host charging stations, especially with respect to utility planning and timelines
 - Biennial assessment updates – iterative process with ongoing analysis





Motivation

- Comprehensive understanding of where EV chargers and load are going to grow relative to primary circuit capacity
- Tool that helps view charging infrastructure within the context of the CEC's [EV Infrastructure Project Tracker](#)
- Assist with planning related to IEPR forecasting, grid readiness, and EV charging assessment (e.g. [AB 2127](#))

EVSE Deployment and Grid Evaluation (EDGE) Tool

EDGE helps users identify regions of the grid that could suitably host EV chargers or may need capacity upgrades. It is recommended to view the EDGE tool on a desktop computer for best experience.

[Download data](#) 

[ACCESS THE TOOL](#) >





Methodology



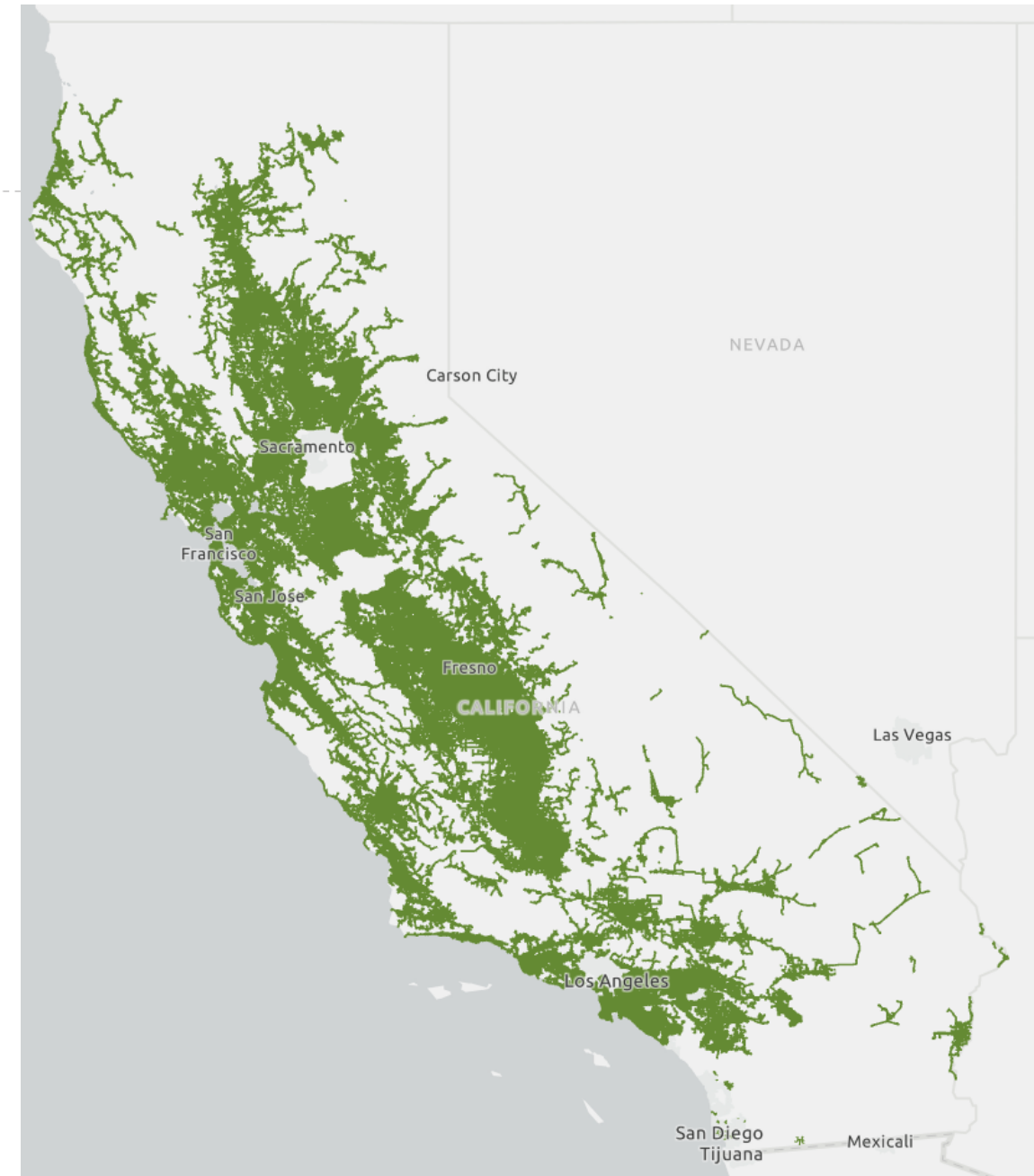
Data Inputs

Distribution grid data

- Grid Needs Assessment (**GNA**) datasets – primary circuit and substation capacity

Electric vehicle charging infrastructure projections

- EVI-Pro – light-duty (LD) plug-in electric vehicle (PEV) load
- HEVI-LOAD – MDHD PEV load



IOU GNA circuit data



Distribution Grid Capacity

- EDGE uses grid capacity values based on calculated circuit “headroom”
- **Headroom = [Equipment rating] – [Forecasted load]**
 - This calculation is done for each forecasted year in the IOU GNAs
 - Positive headroom indicates the circuit can support forecasted load
 - Negative headroom indicates the forecasted load exceeds circuit rating
- The calculation is performed for **whole circuit lines** before the aggregating to traffic analysis zones (TAZs) and incorporating modeled EV charging load

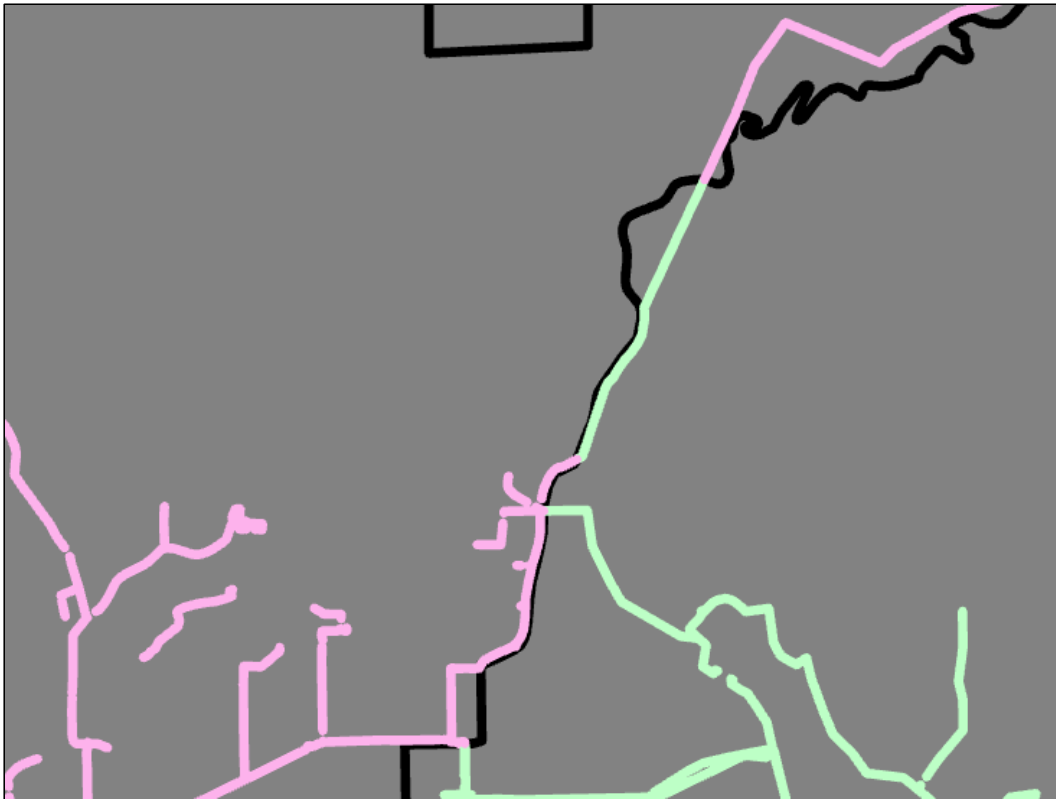
Example Table (load values in MW):

Circuit ID	Equipment rating	2022 forecasted load	2023 forecasted load	2024 forecasted load	2025 forecasted load	2022 headroom	2023 headroom	2024 headroom	2025 headroom
123	2.0	0.5	0.6	0.7	0.8	1.5	1.4	1.3	1.2
456	1.1	1.0	1.1	1.2	1.3	0.1	0.0	-0.1	-0.2
789	0.7	0.4	1.0	1.2	1.8	0.3	-0.3	-0.5	-1.1



Aggregating IOU Data

- TAZs are defined by the number of trips leaving/arriving a certain geographic area
- Primary circuits are long lines that can span multiple TAZ boundaries
- Circuits are virtually split to assess the percentage of each line that sits within different TAZ polygons
- Overall circuit capacity (headroom) is multiplied by this percentage and then summed up per TAZ



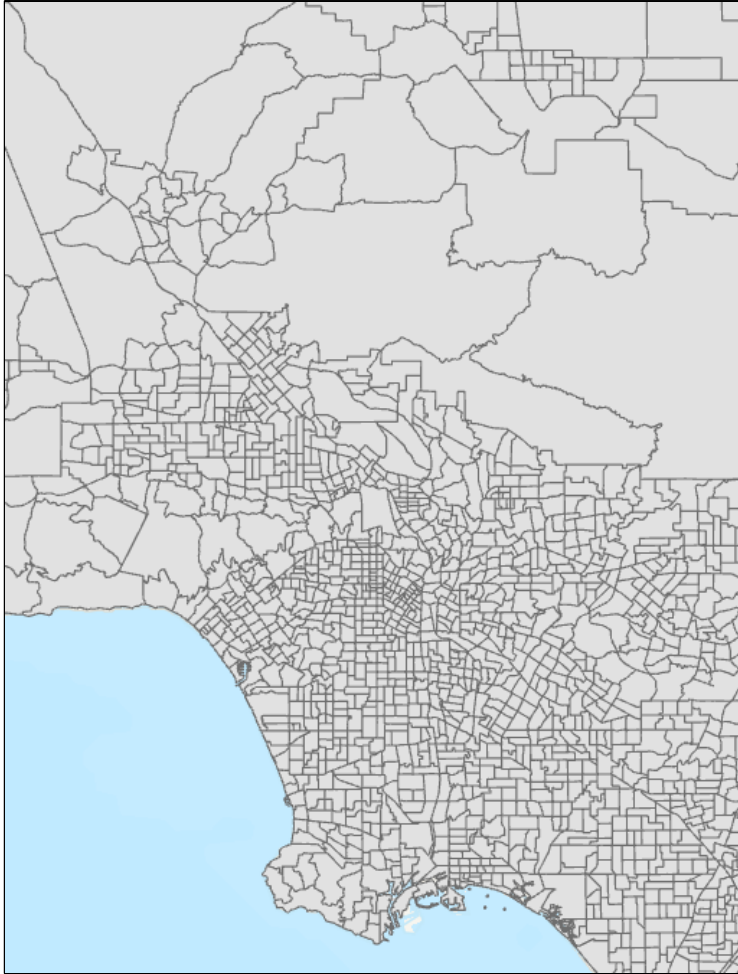
$$\begin{aligned} & \text{Circuit capacity in a TAZ} \\ &= \sum_{i=1}^n C_i * \frac{l_1 + \dots + l_m}{L_1} + \dots + C_n * \frac{l_1 + \dots + l_m}{L_n} \end{aligned}$$

$C_1 \dots C_n$ = Power capacity of an entire circuit line

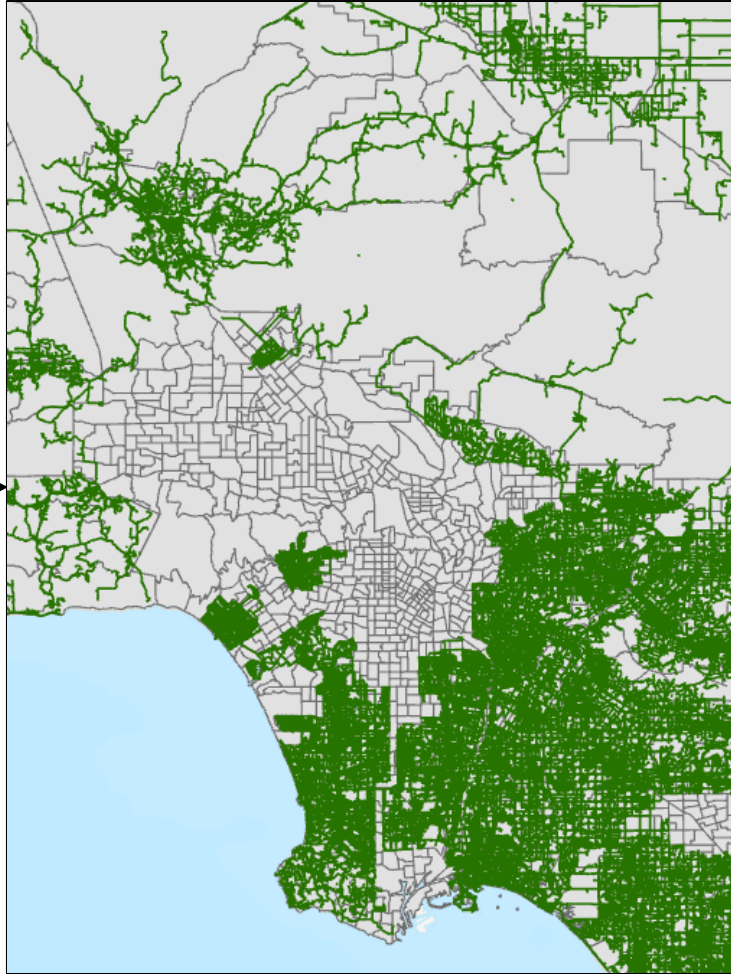
- $l_1 \dots l_m$ = Length of individual split circuit pieces
- $L_1 \dots L_n$ = Length of an entire circuit line



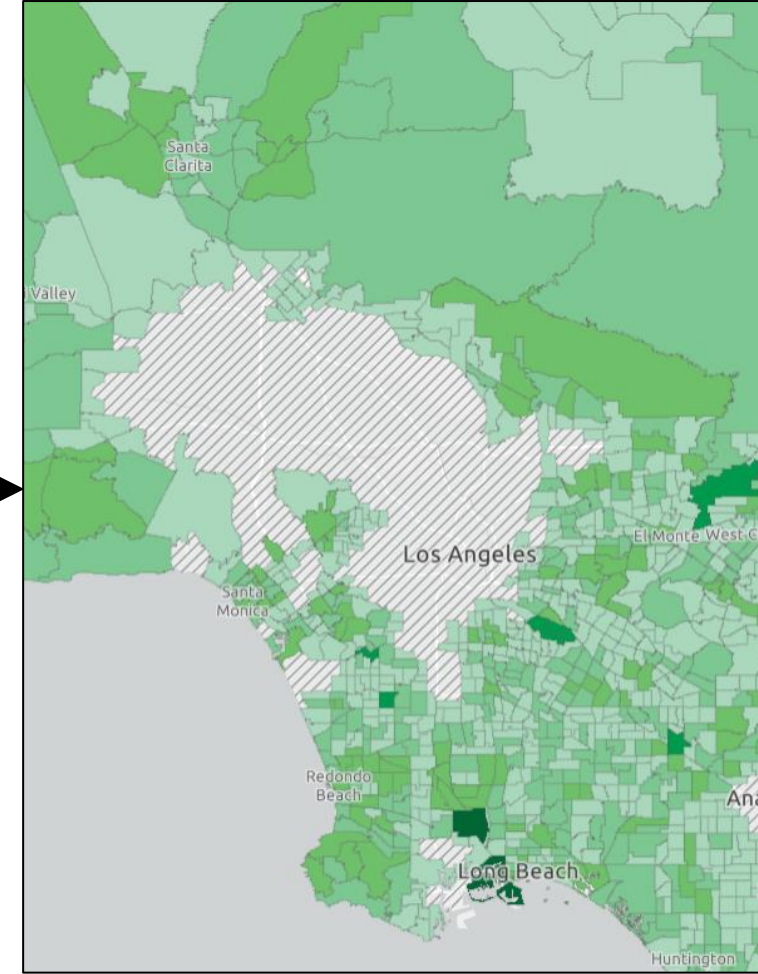
Assigning Capacity to TAZs



Traffic Analysis Zones (TAZs)



Grid Needs Assessment (GNA)



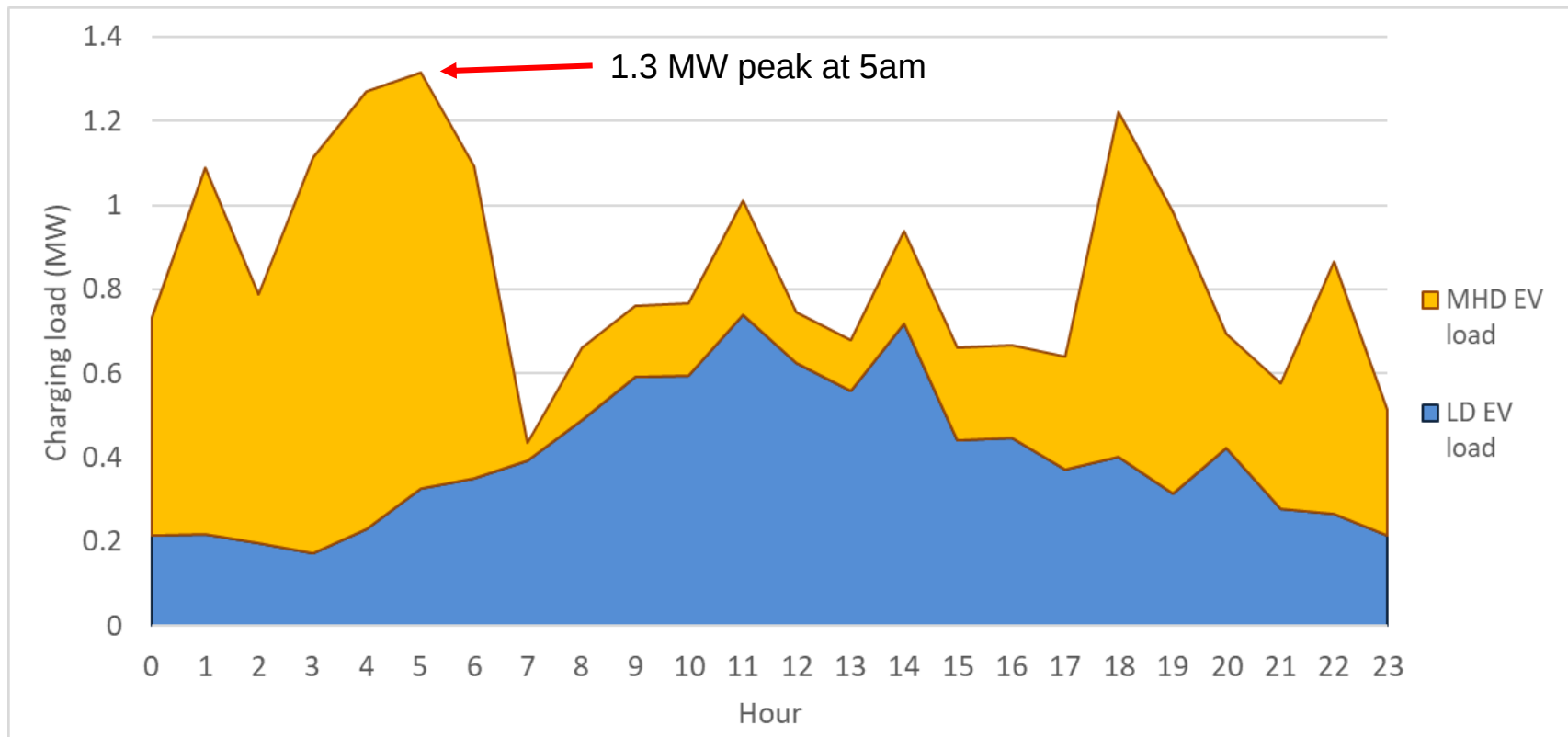
Aggregated Circuit Capacity



EV Charging Load

- TAZ-level hourly EV load profiles from EVI-Pro and HEVI-LOAD for 2025
- Load profiles added together, overall peak compared to circuit capacity from previous step
- Can determine which hour EV load peaks, uncertain about which hour circuit load peaks

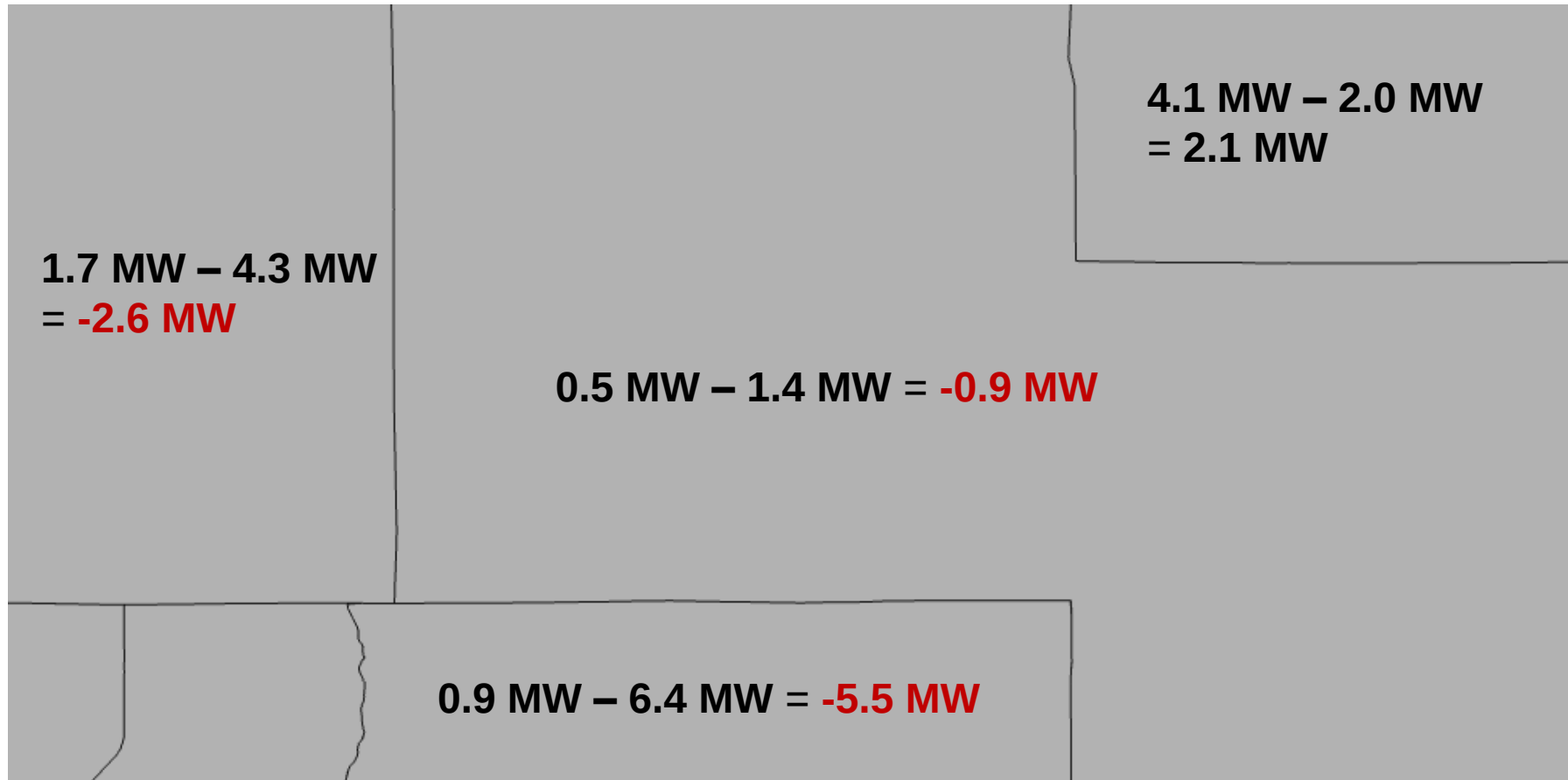
EV Charging Load Profile for a TAZ in Los Angeles County





Calculating CIM

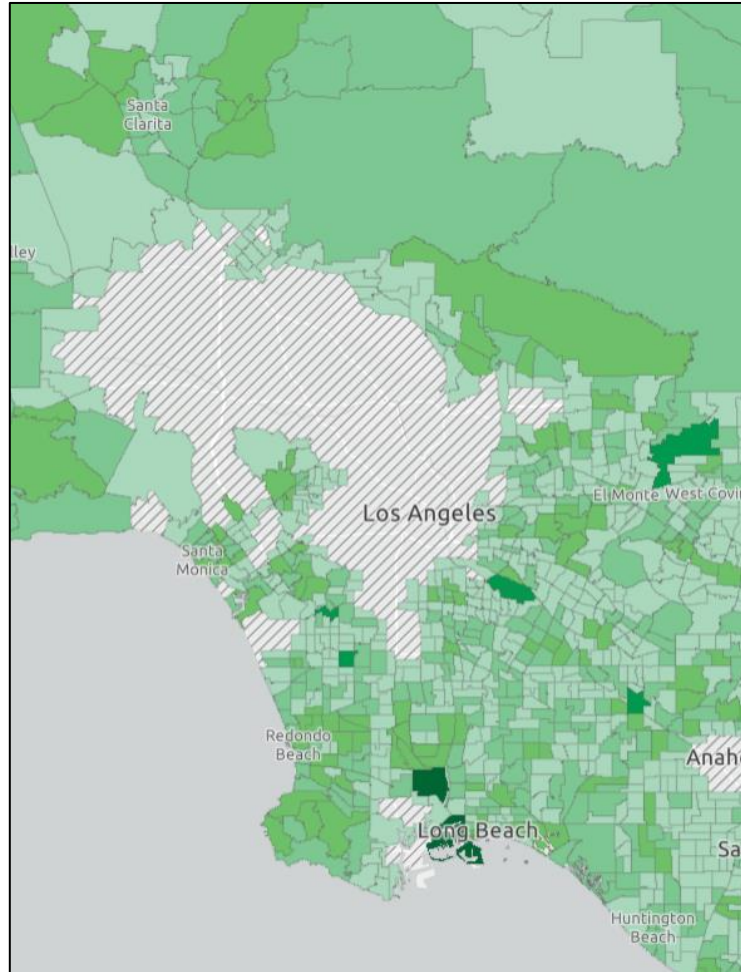
- The Capacity Indicator Metric (CIM) is calculated as:
[Aggregated Circuit Capacity] – [EV Peak Load] = [CIM]
- Positive CIM values mean TAZ can potentially accommodate EV load
- Negative CIM values show TAZs where modeled EV load exceeds projected grid capacity



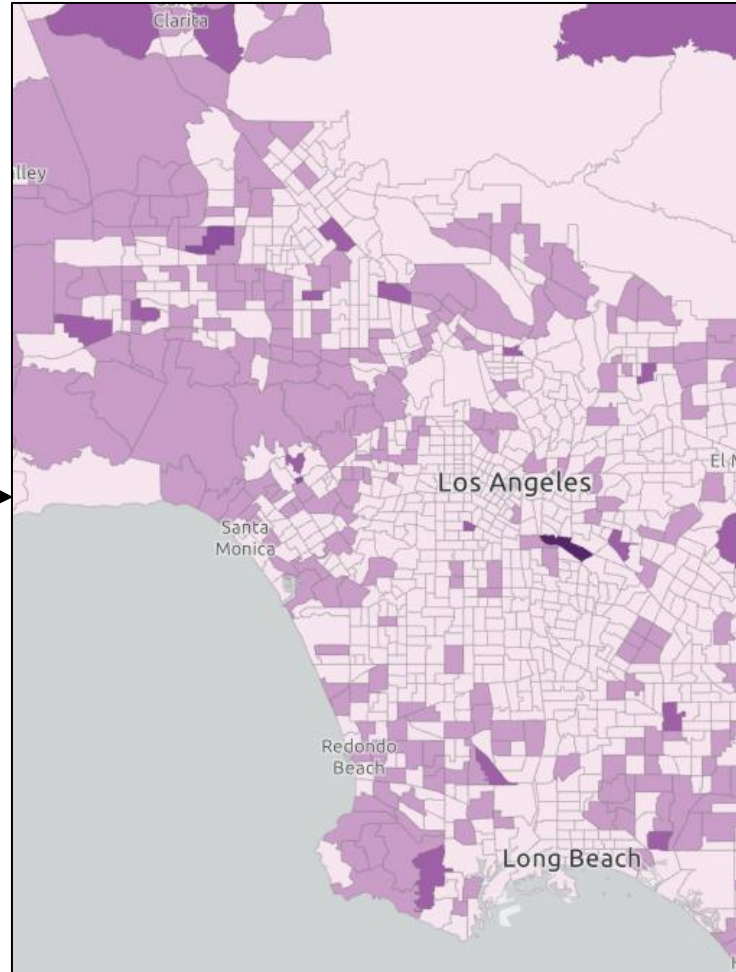


Geospatial Aggregation

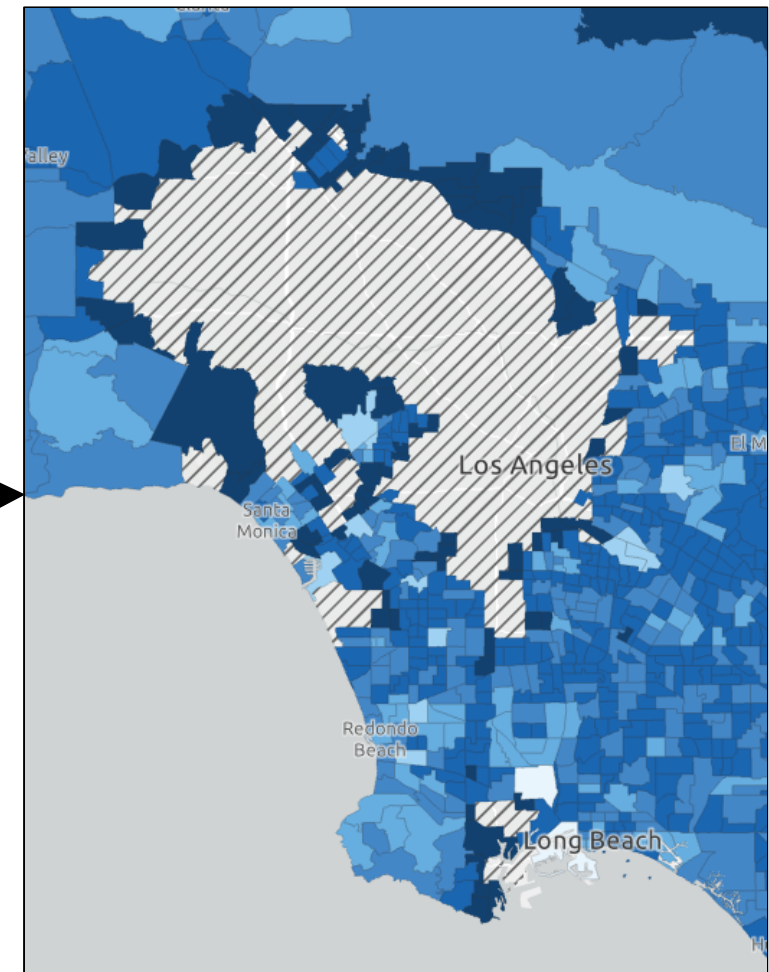
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Aggregated Circuit Capacity



Peak EV Charging Load



Capacity Indicator Metric (CIM)



EDGE Tool Demonstration



Accessing the Tool



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EVSE Deployment and Grid Evaluation (EDGE) Tool

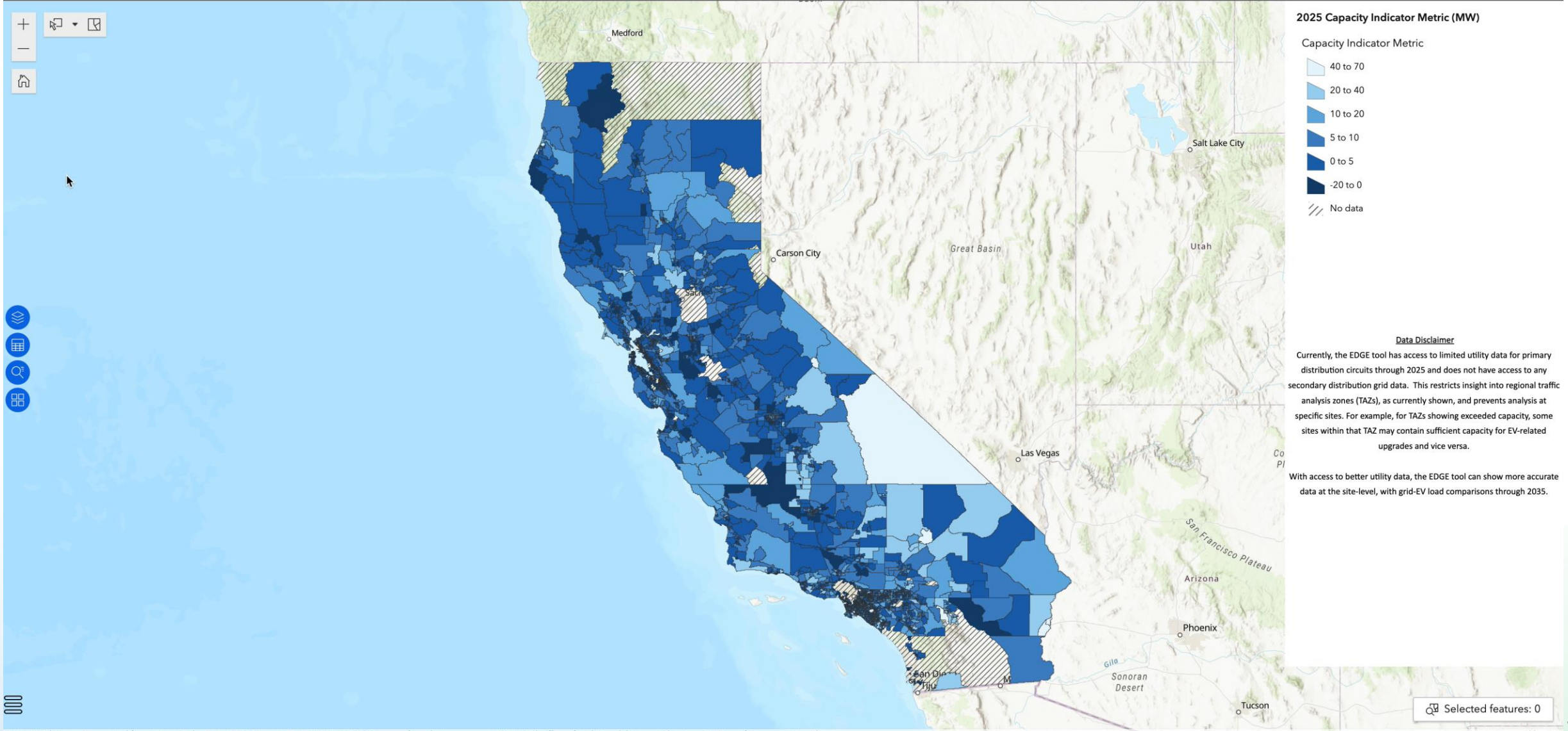
The EVSE Deployment and Grid Evaluation (EDGE) Tool gives users access to data and helps inform EV charging deployment efforts and associated grid planning.

CONTACT



Data Layers

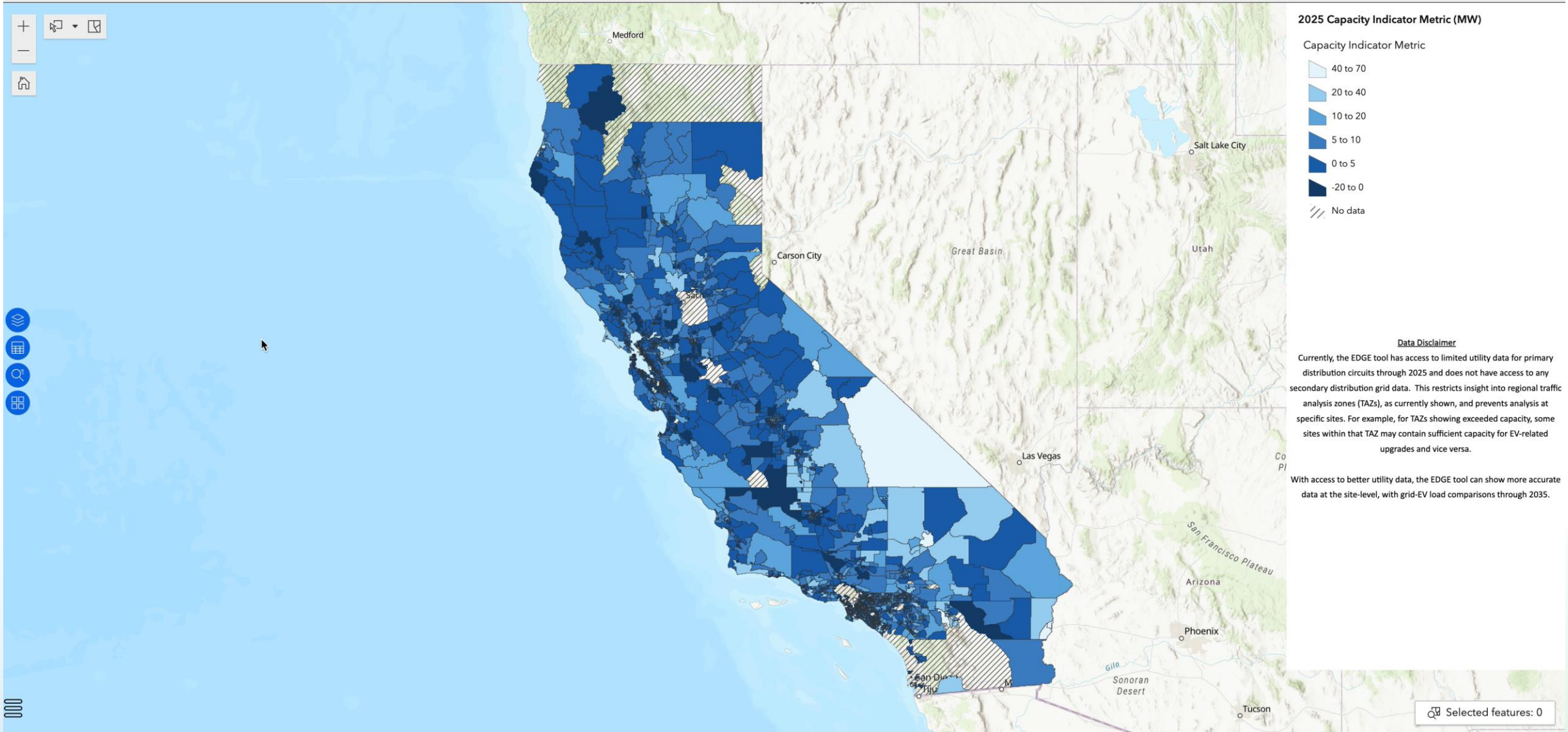
EVSE Deployment and Grid Evaluation (EDGE) Tool (version 0.5)





Data Table

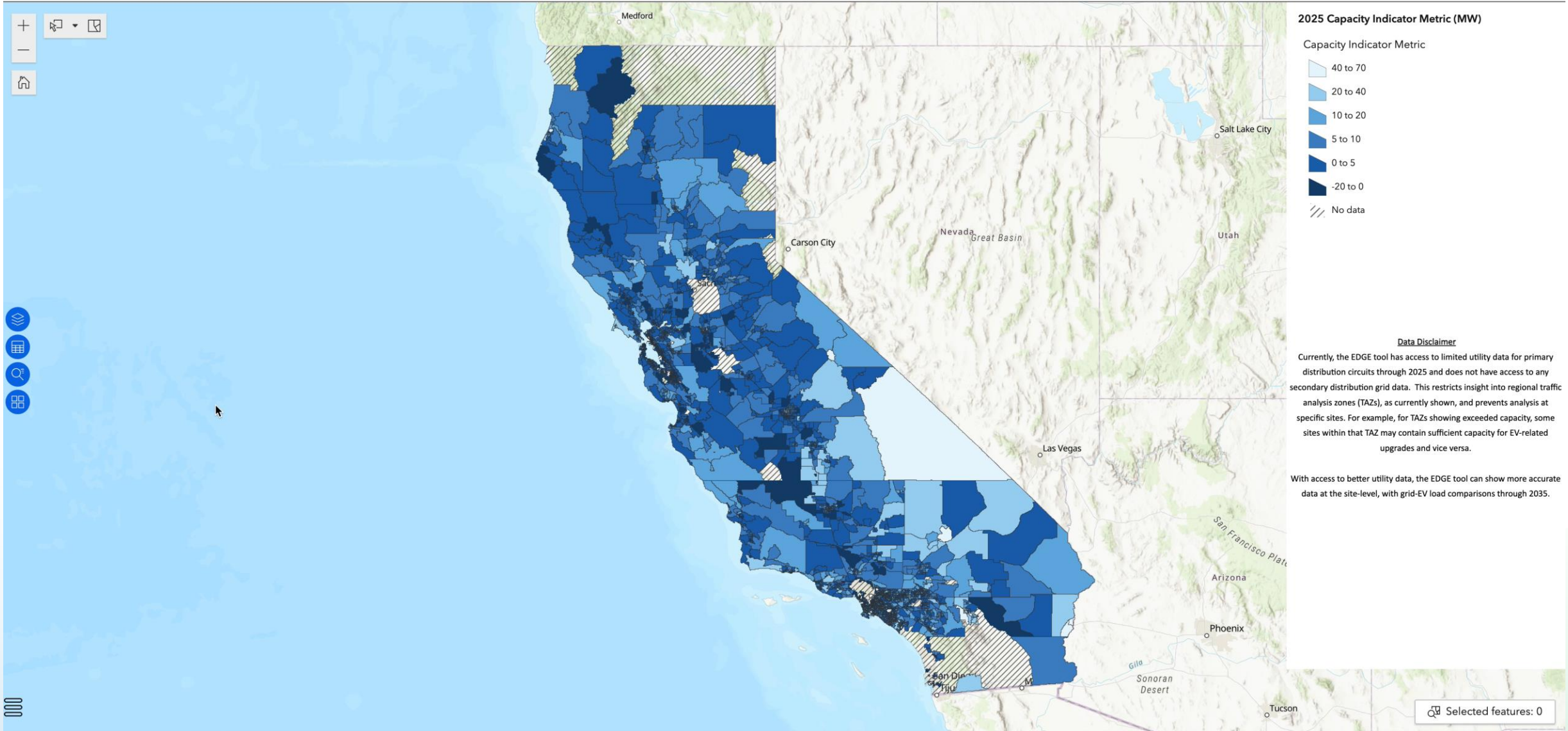
EVSE Deployment and Grid Evaluation (EDGE) Tool (version 0.5)





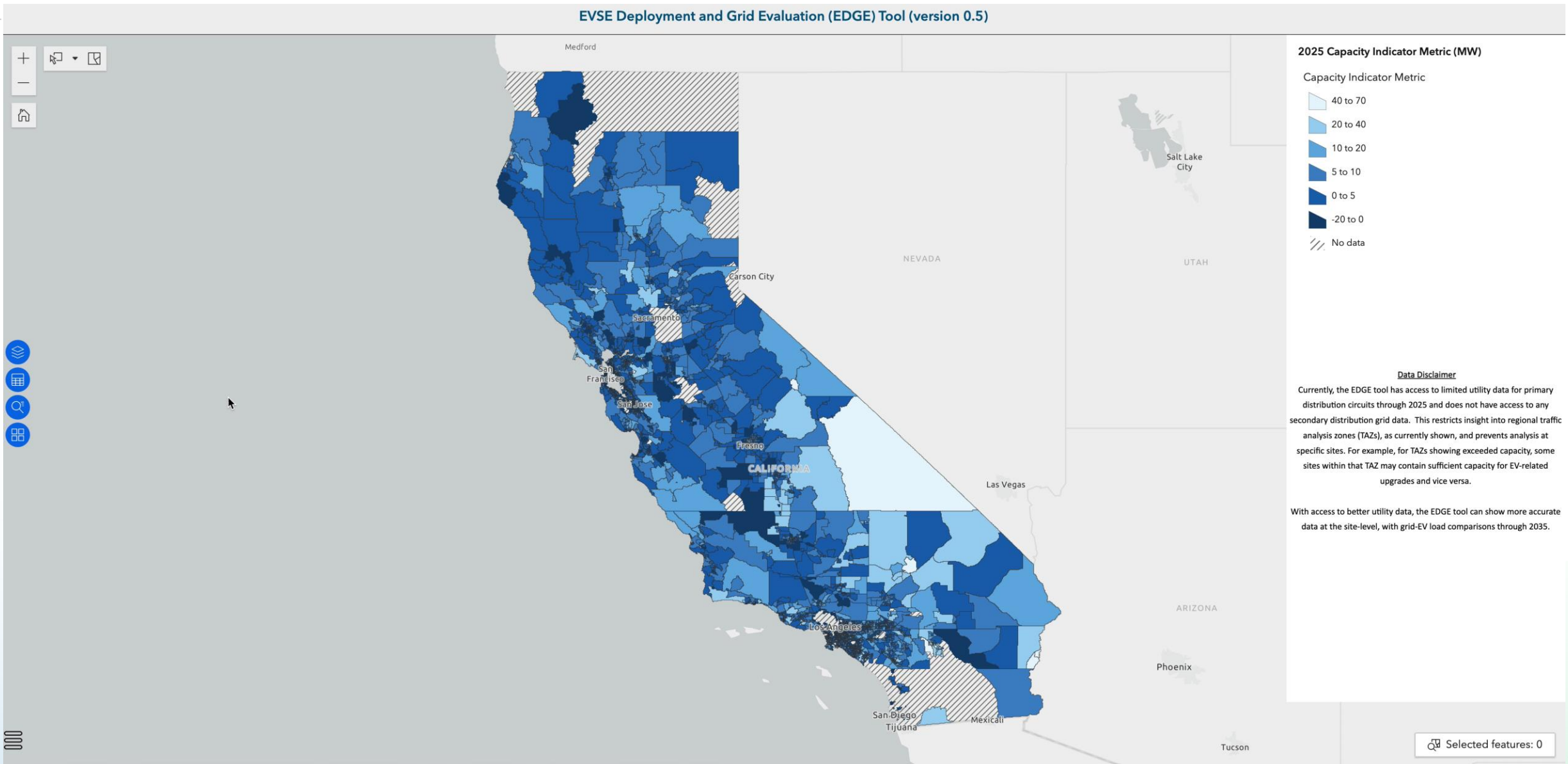
Basemap Selection

EVSE Deployment and Grid Evaluation (EDGE) Tool (version 0.5)





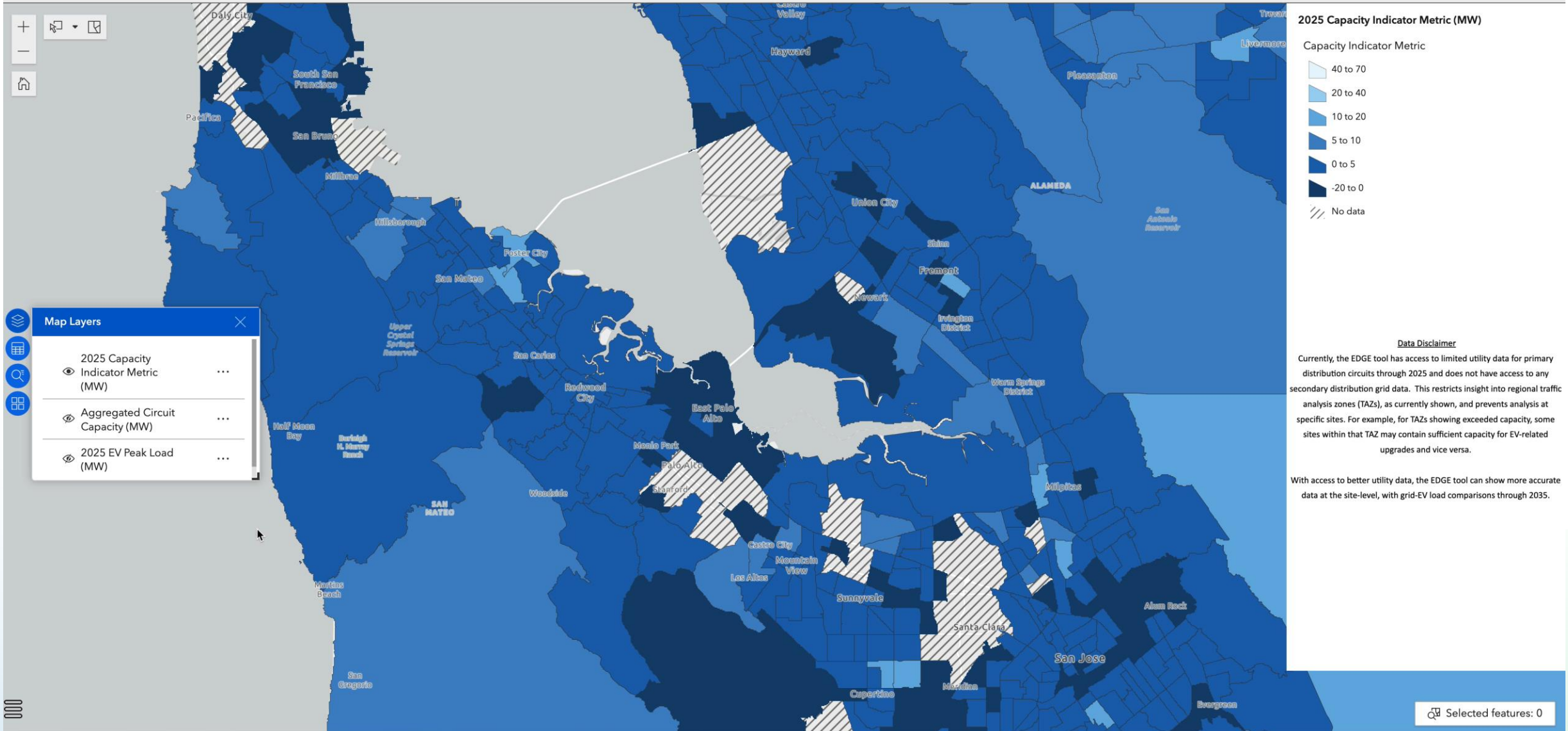
Search Function





Popup Box Display

EVSE Deployment and Grid Evaluation (EDGE) Tool (version 0.5)





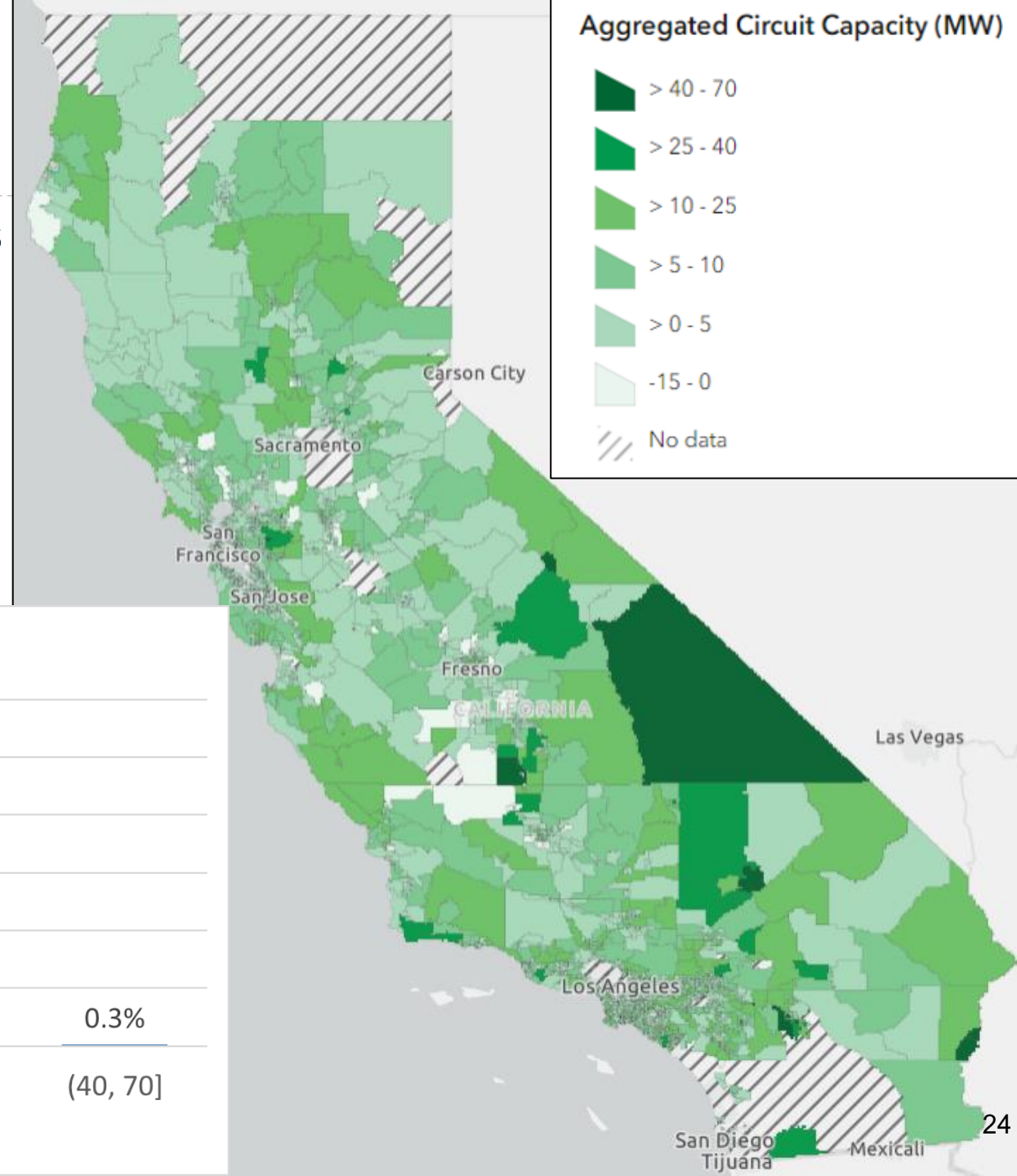
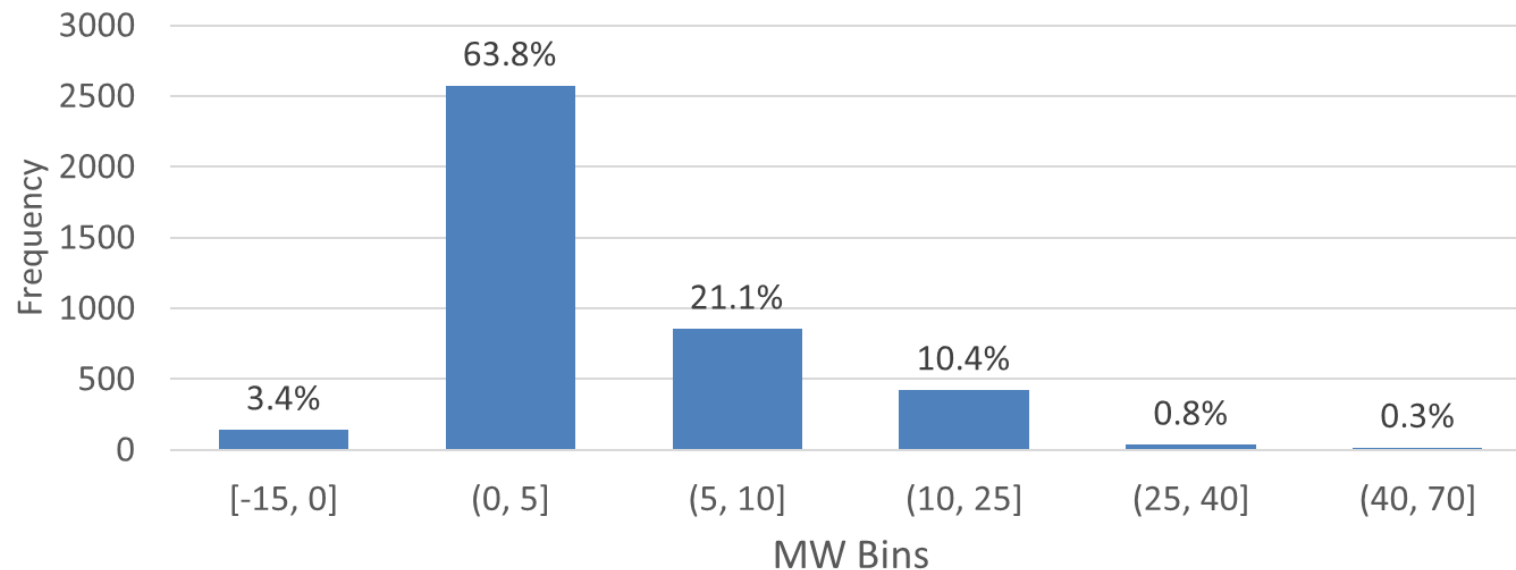
Initial Results



Initial Results – Circuit Capacity

- 2025 aggregated circuit capacity from IOU GNAs
- 64% of TAZs reported up to 5 MW additional capacity
- 3% of TAZs reported 0 MW or less. Of those:
 - 96% in PGE territory
 - 0% in SCE territory
 - 4% SDGE territory

Distribution of Aggregated Circuit Capacity in CA TAZs

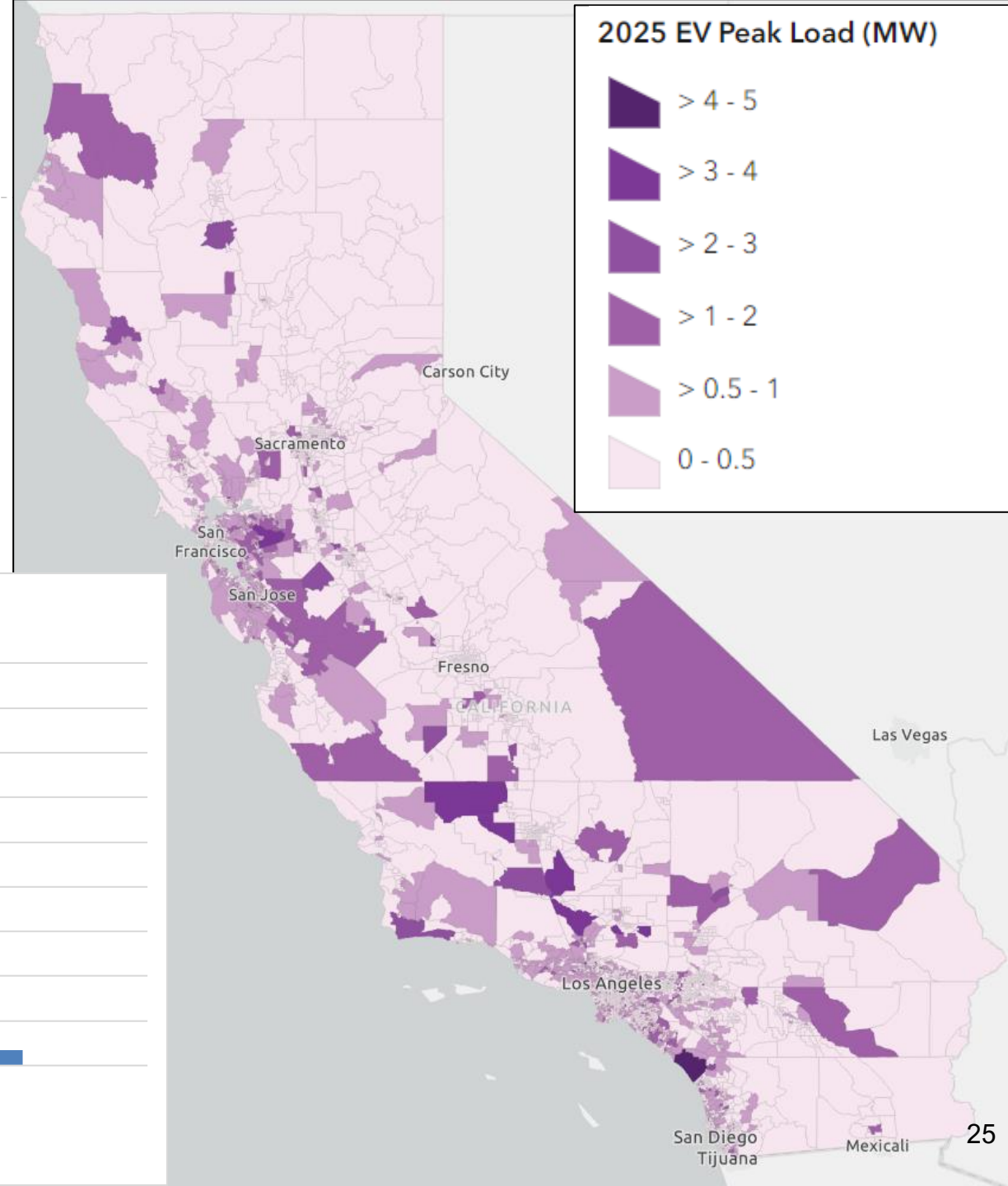
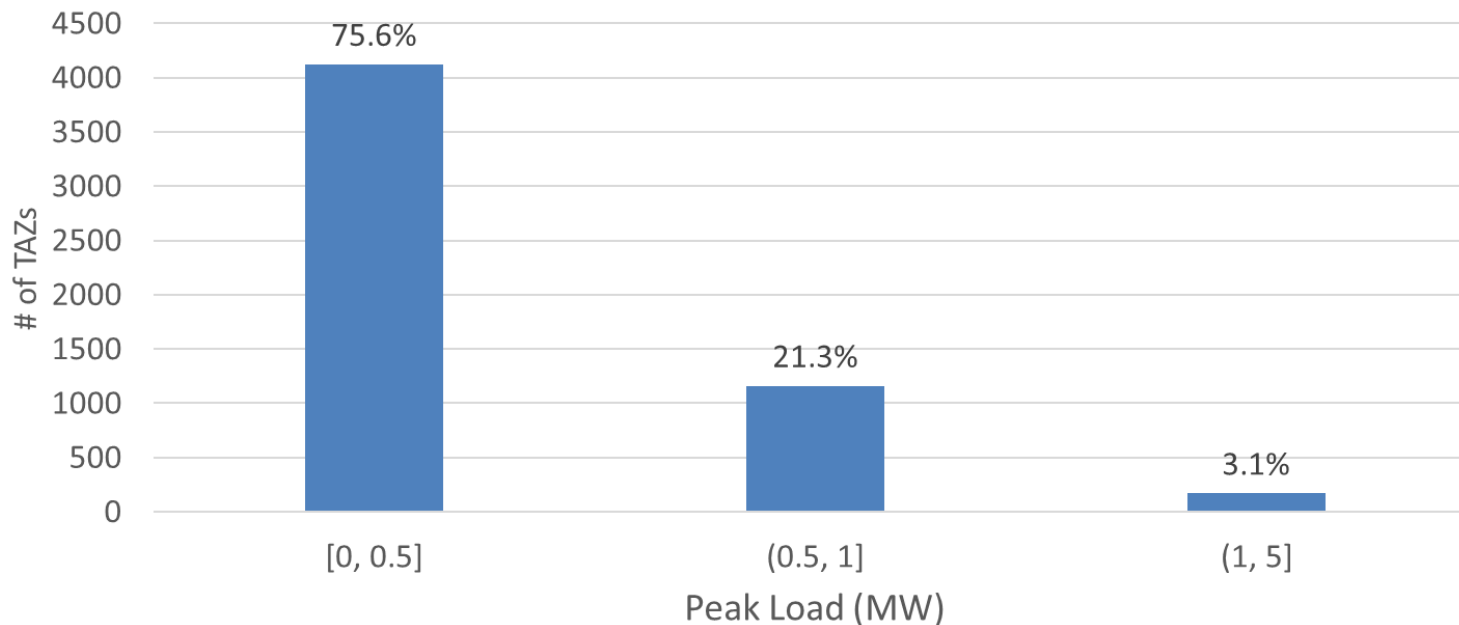




Initial Results – EV Peak Load

- 2025 TAZ-level peak load based on hourly load profiles from EVI-Pro and HEVI-LOAD
- 76% between 0 – 0.5 MW
- 21% between 0.5 – 1 MW
- 3% between 1 – 5 MW
 - Mostly in LA, San Diego, and Bay Area

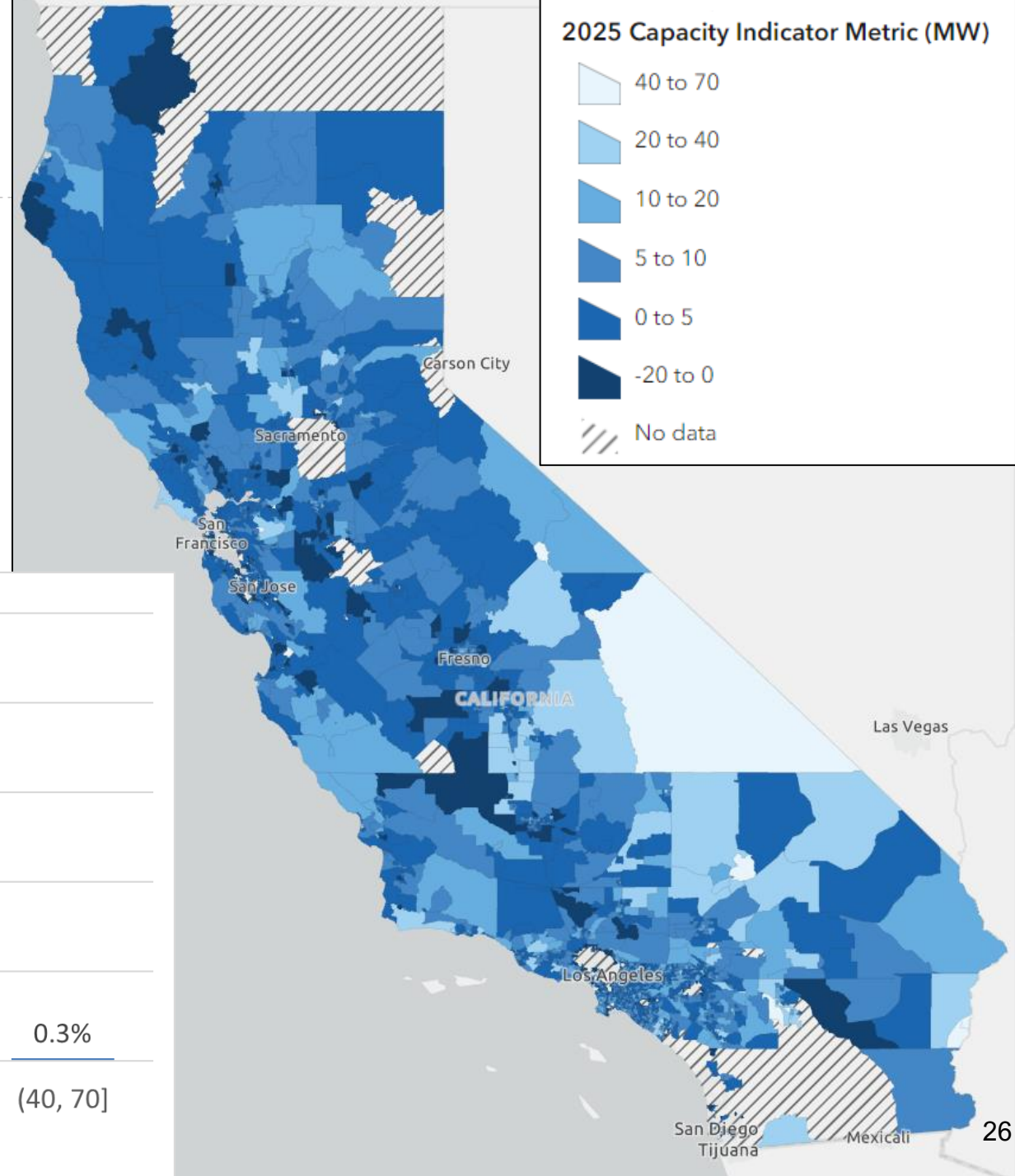
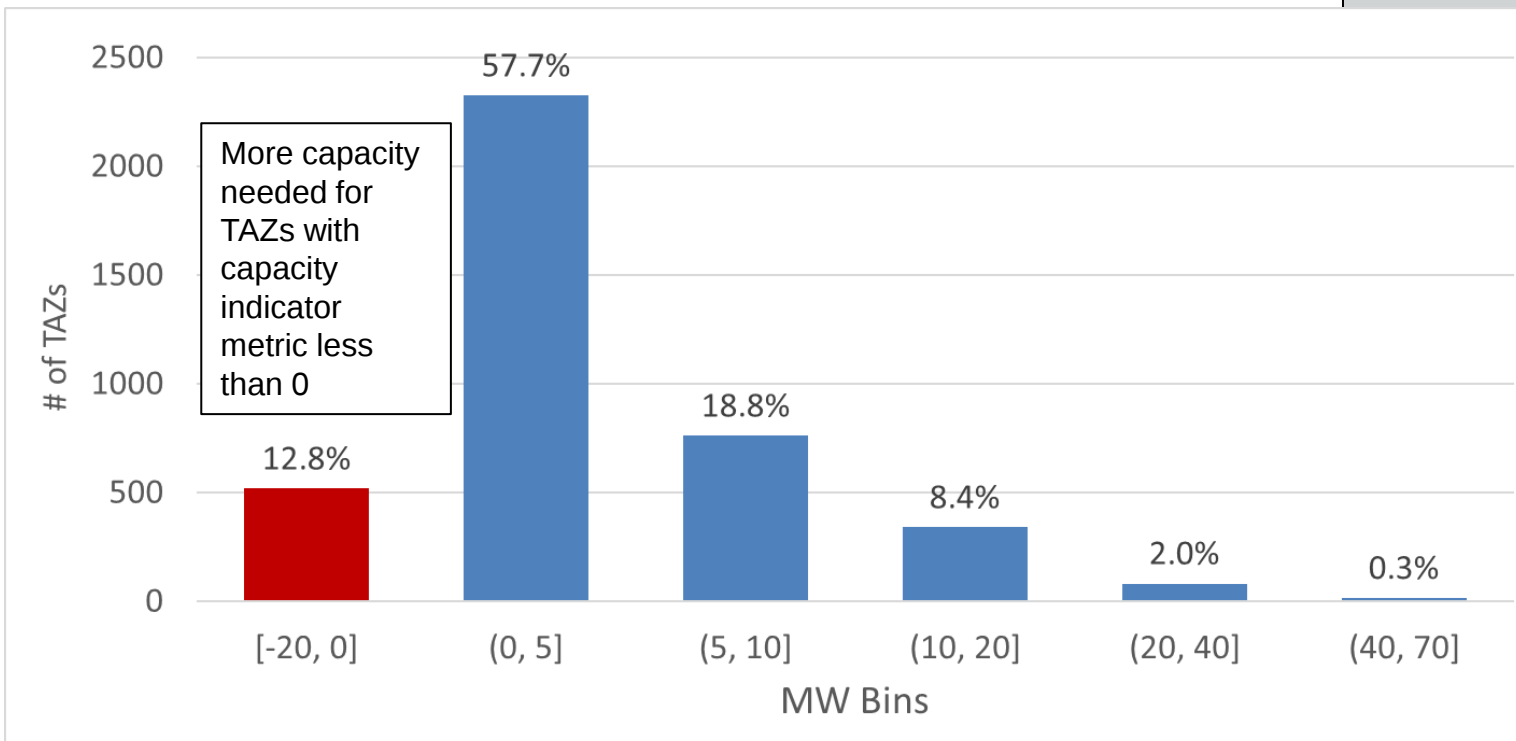
Distribution of EV Charging Peak Load in CA TAZs





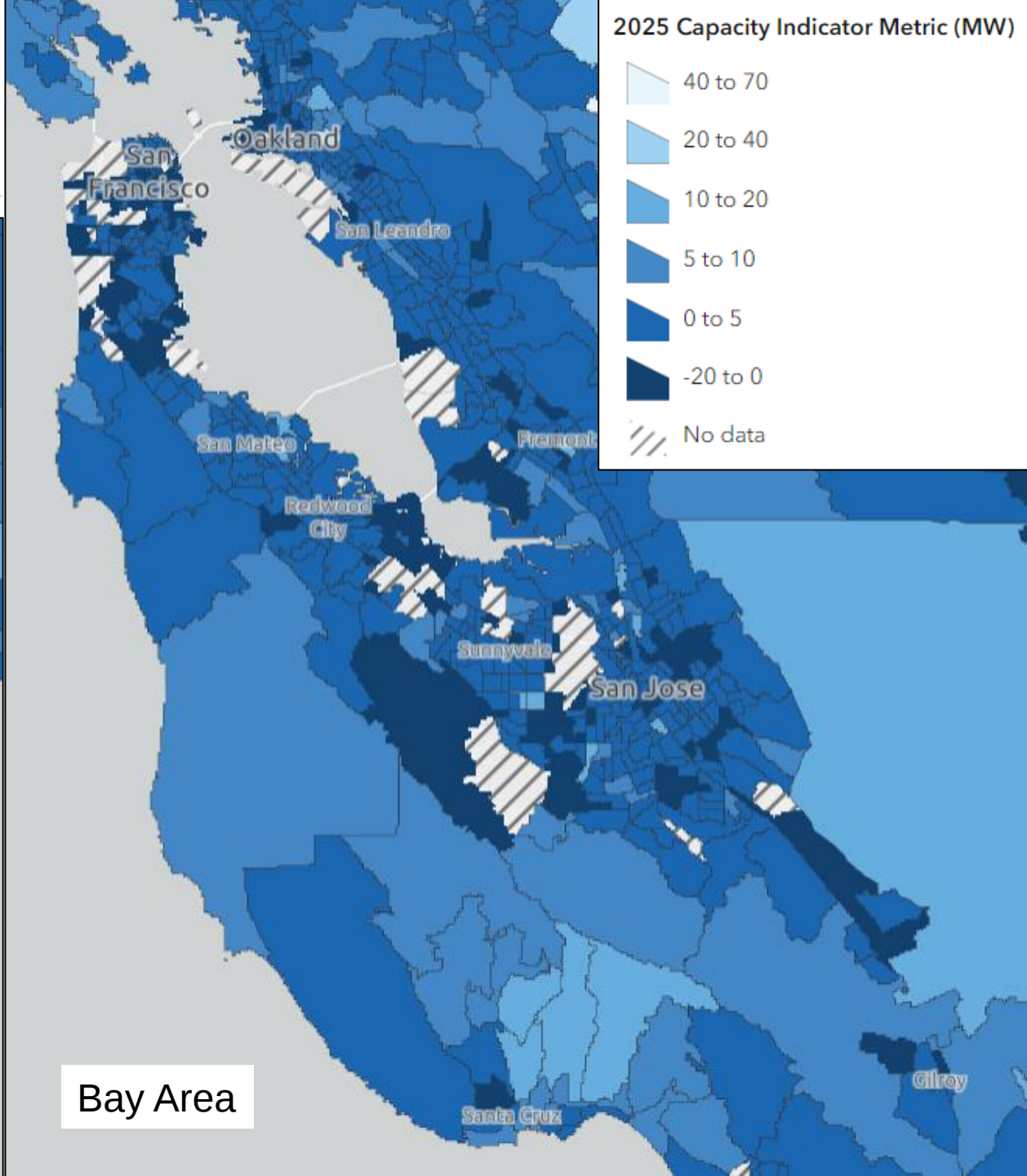
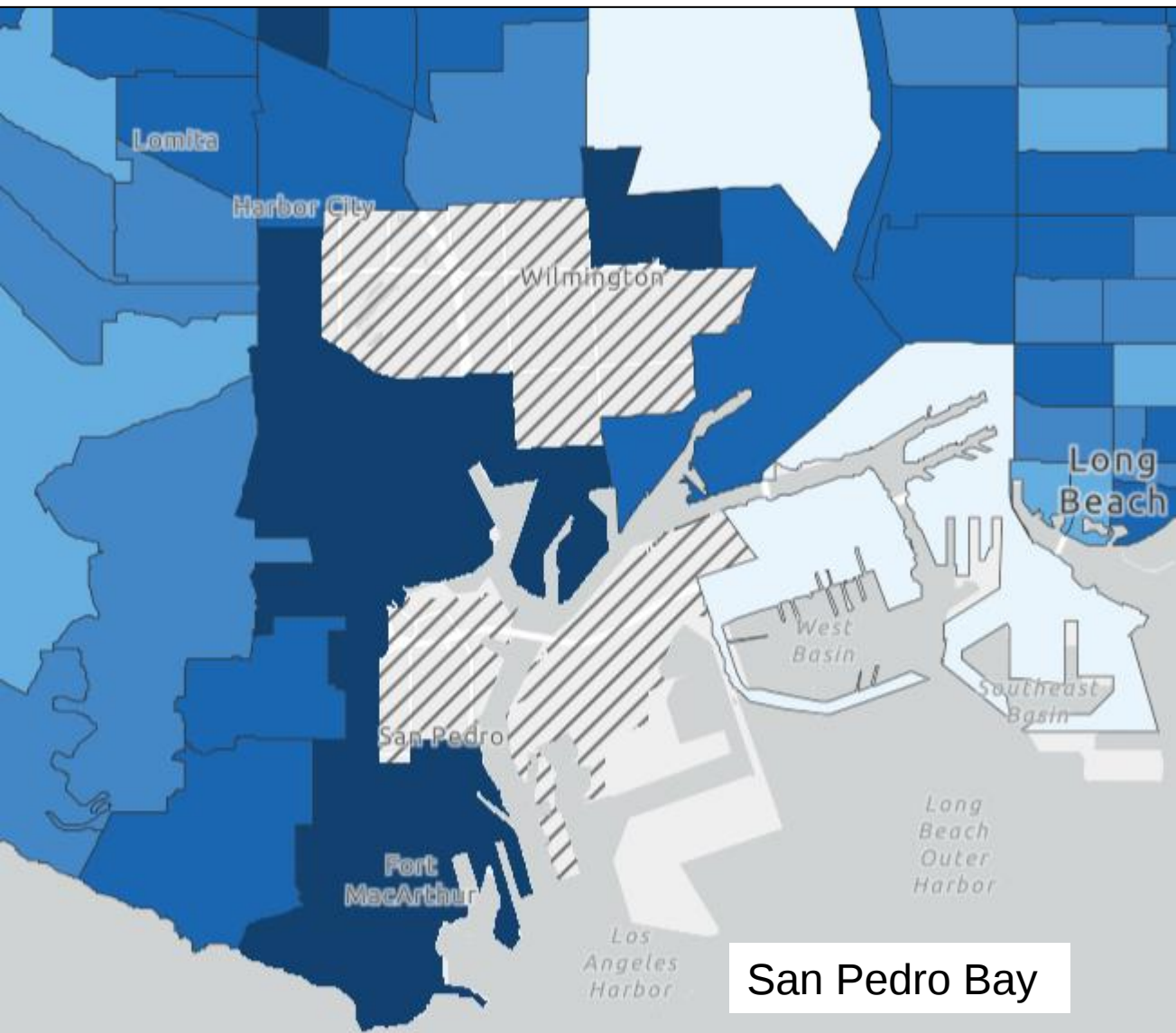
Initial Results – CIM Values

- 2025 GNA data + 2025 modeled EV peak load (no official designation to IEPR forecasting)
- 5,454 TAZs in CA – only 74% have any grid data. Of those:
 - 58% (2,323) - within 5 MW of upgrade
 - 13% (516) - assessed need of up to 20 MW
- High density clustering of TAZs with CIM < 0





Notable Areas with Negative CIM





Conclusion



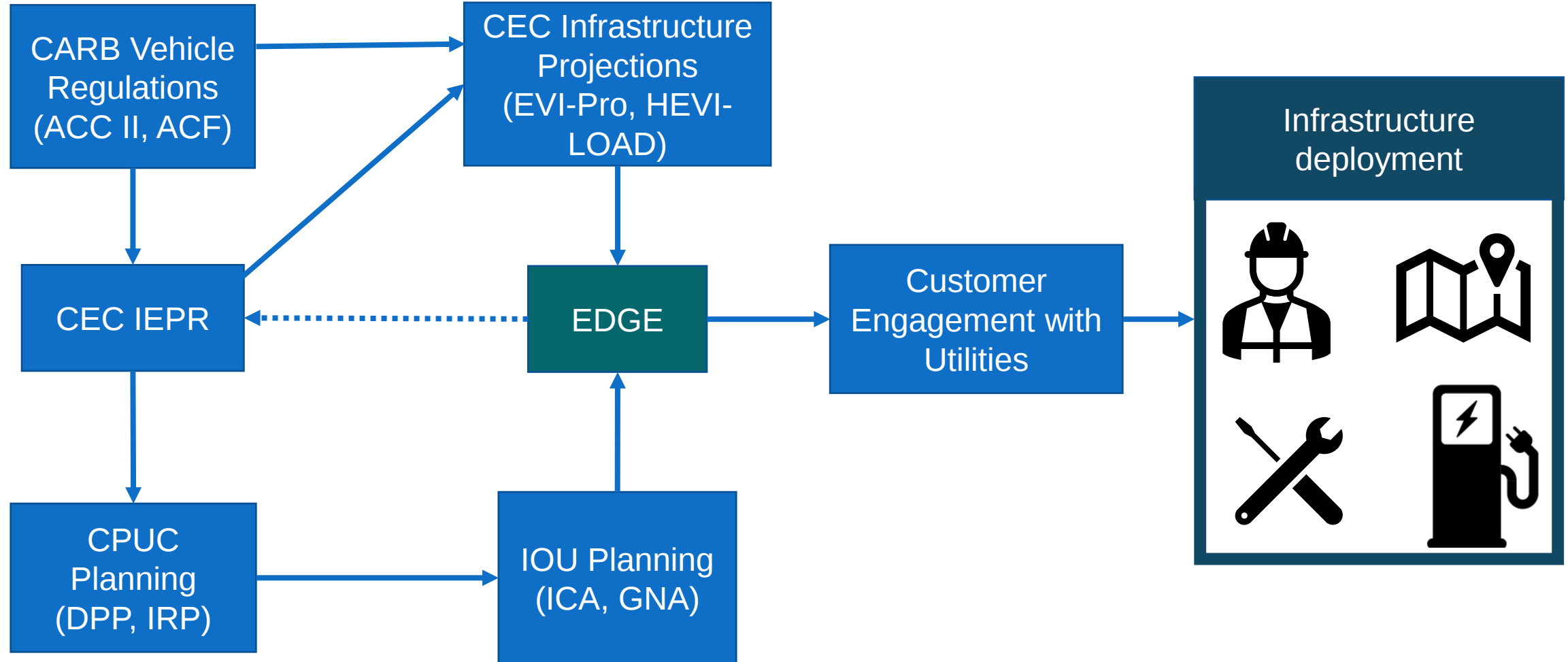
How Can EDGE Results Be Used?

- EDGE is a flagging tool
- Insights related to CEC's EV Project Tracker
- Provide preliminary information to project developers
 - Expected load growth (CEC models)
 - Limited capacity (as reported by IOUs)
- Assist in customer application development, engaging with utilities early
- Alert the state and utilities to areas where investment needs are projected



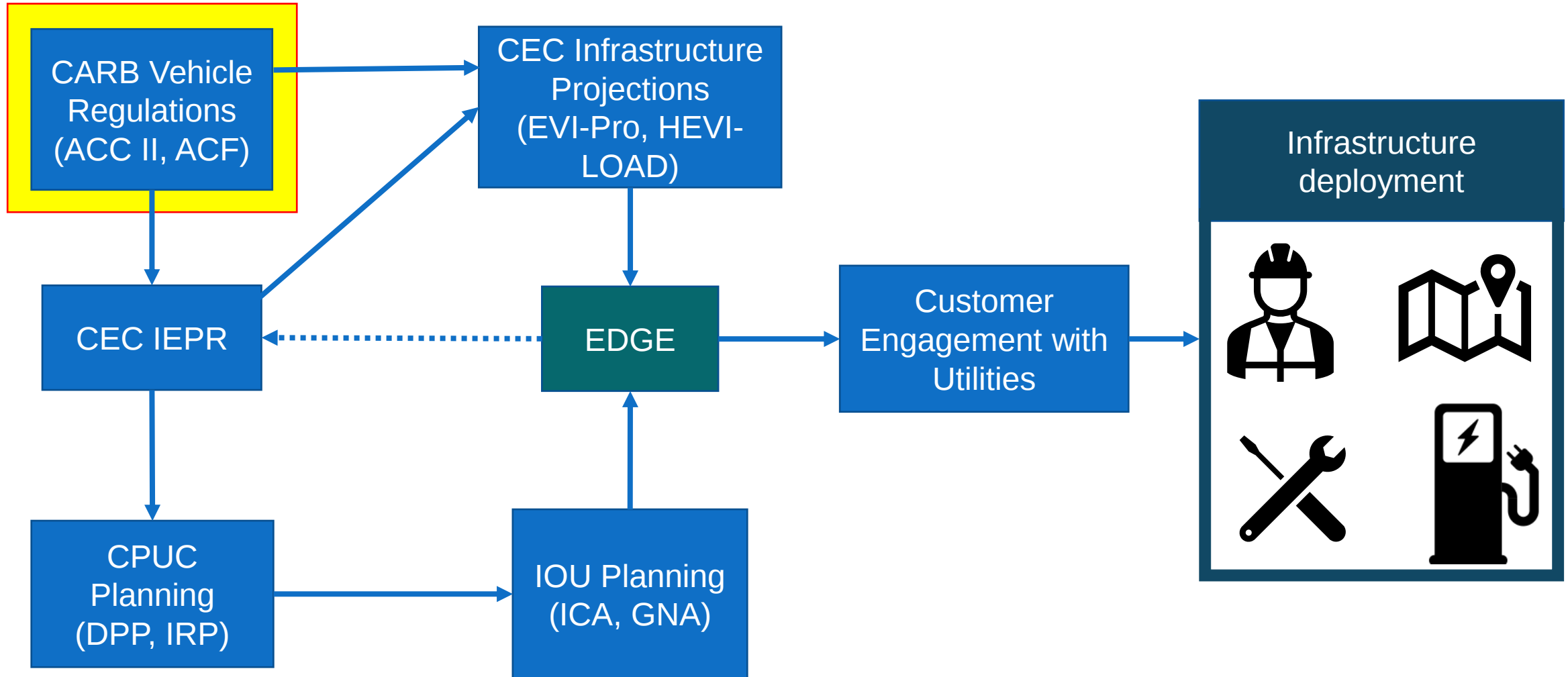


Process Interactions



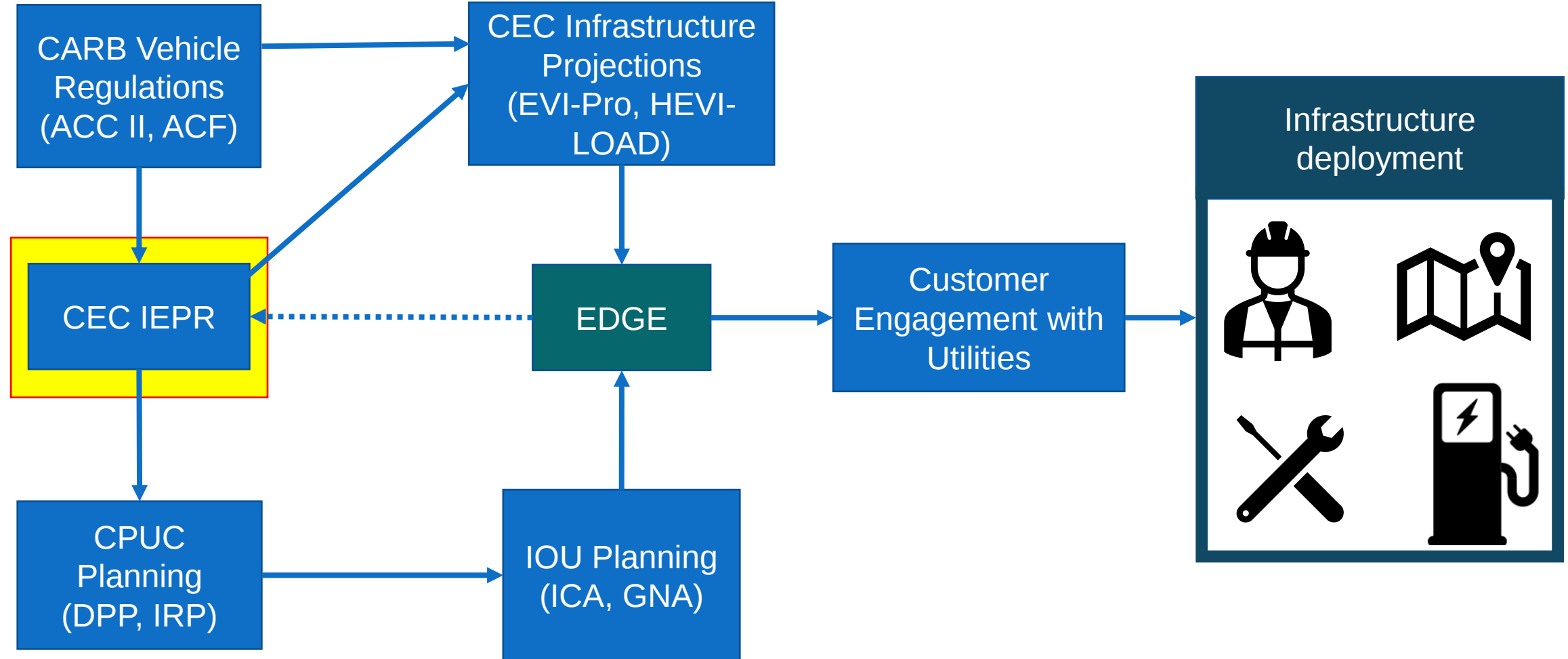


Process Interactions



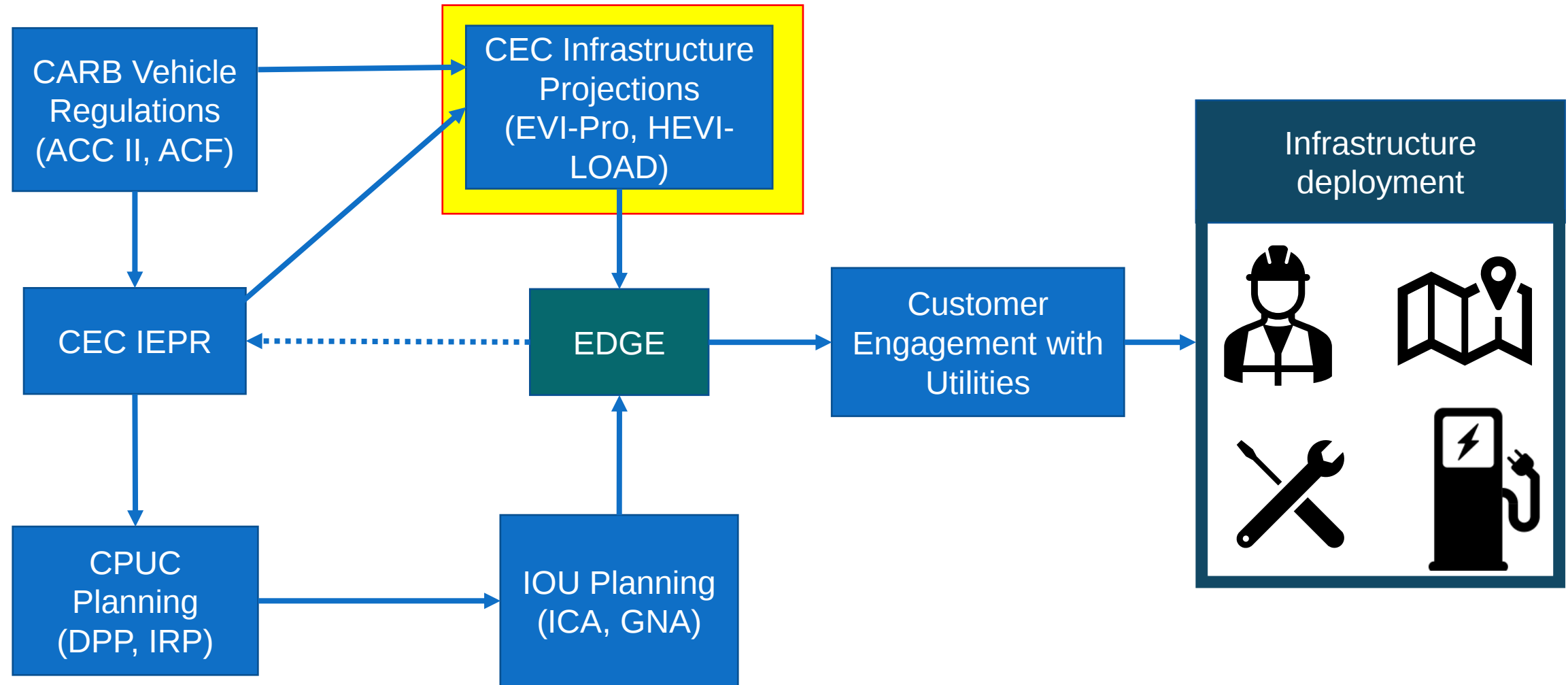


Process Interactions



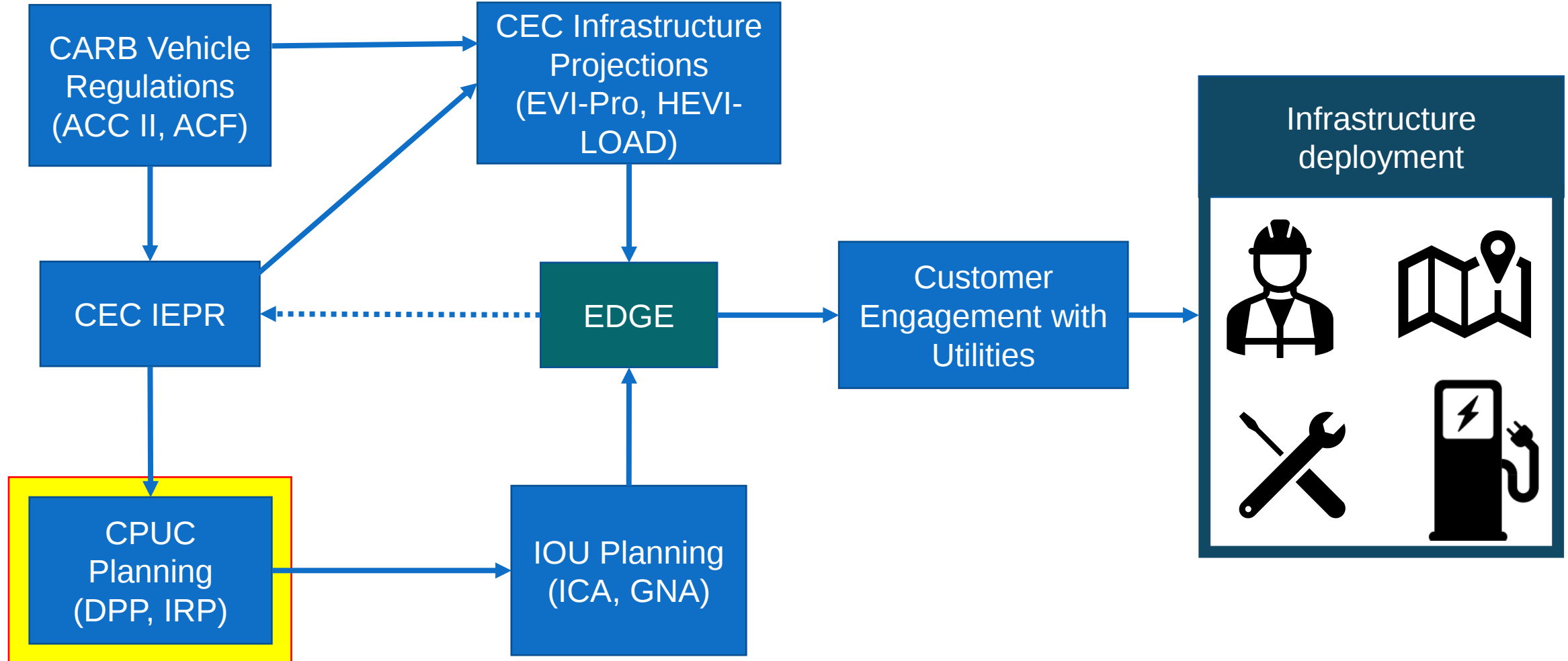


Process Interactions



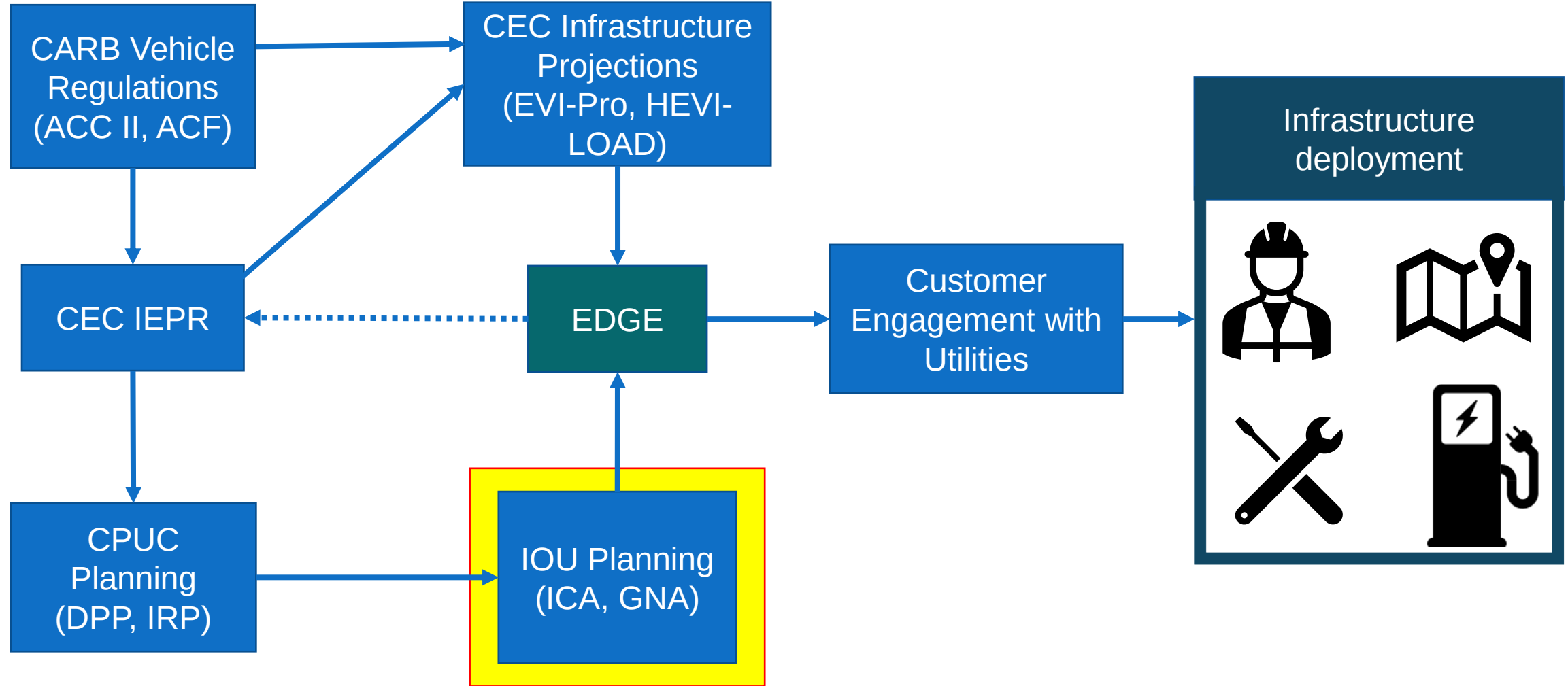


Process Interactions



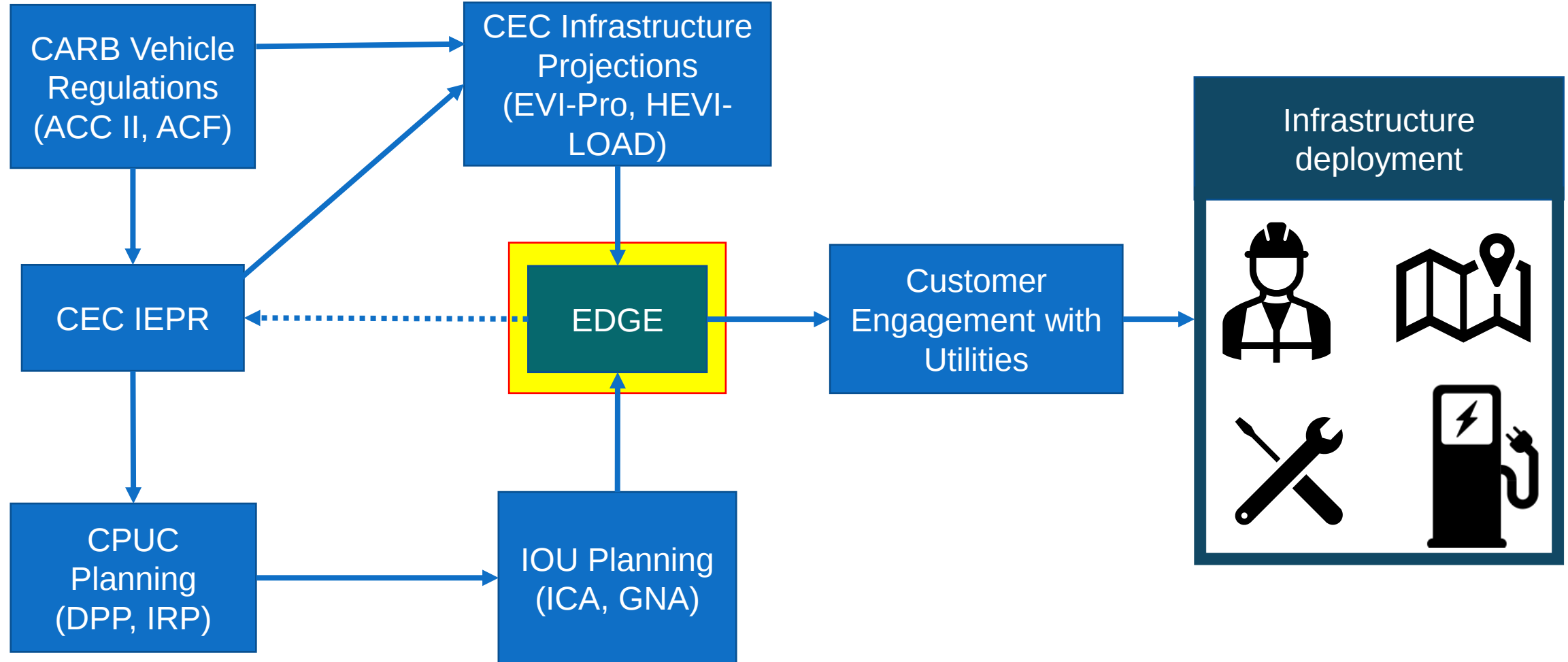


Process Interactions



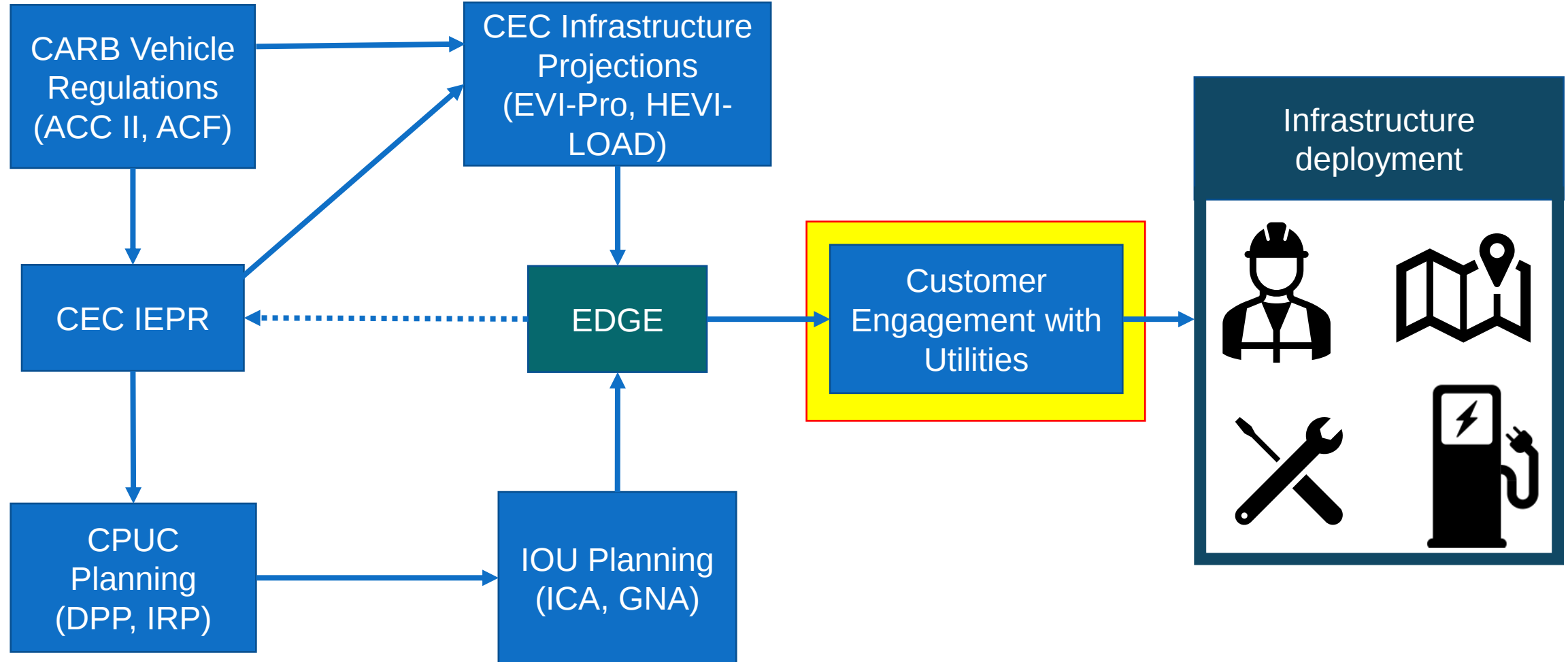


Process Interactions



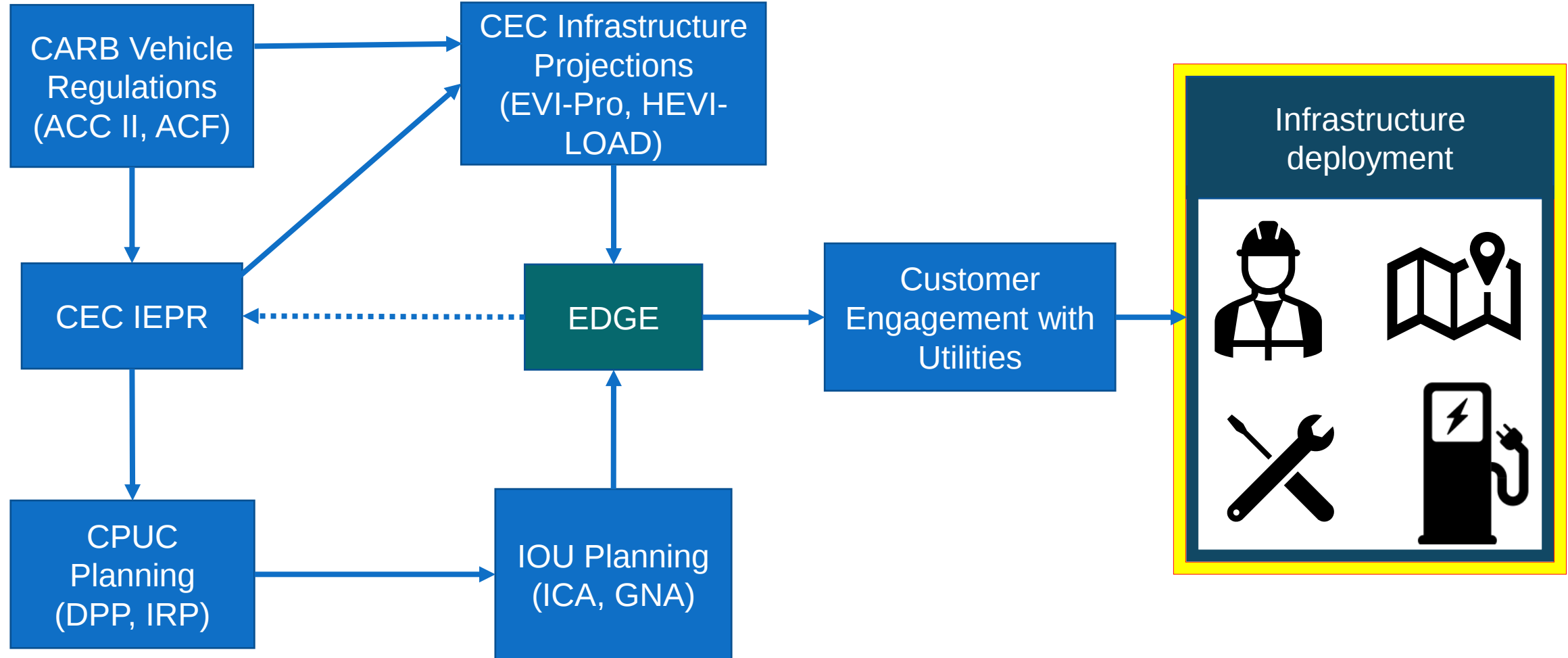


Process Interactions





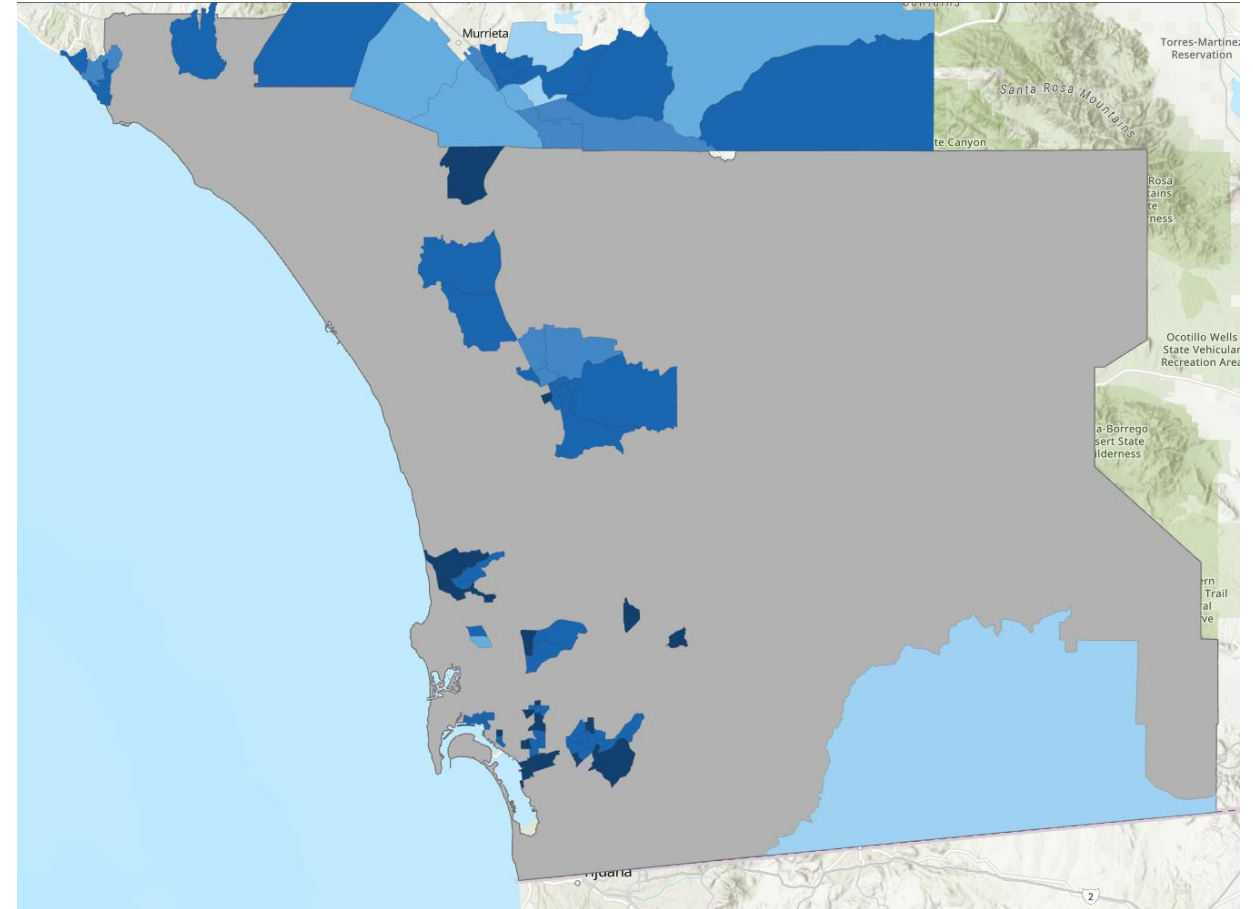
Process Interactions





Barriers and Limitations

- Uncertainty as to when the circuit loads peak could lead to discrepancies with EV peak load calculations
- Unable to identify charging impact on individual circuits
- Cannot assess conditions at specific sites
- Do not have a comprehensive view of statewide grid conditions
 - Lack of data in POU service territories
 - Missing IOU data, e.g. redaction (especially in SDG&E territory), smaller IOUs not subject to requirement, etc.

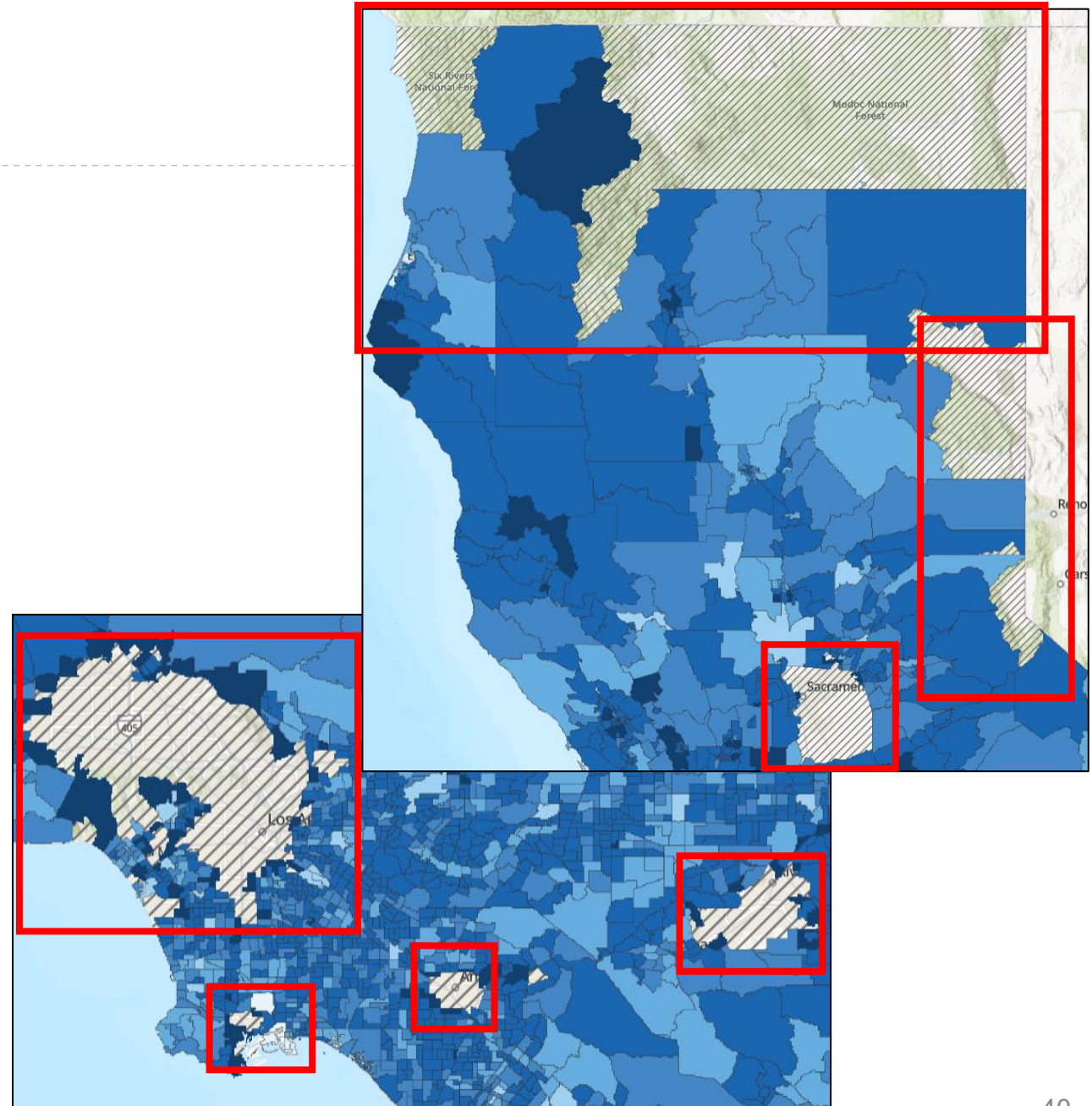


**Sparse grid data (blue) in
SDG&E territory (grey)**



Data Needs

- **Better primary distribution data**
 - Full access to unredacted GNA data → more comprehensive spatial analysis
 - Longer forecast timelines → better visibility into future upgrade needs
- **Secondary distribution system data**
 - More granularity in the analysis → insight into charger siting
- **POUs and other data gaps**
 - POU data → allow EDGE to perform analysis in those areas
 - Circuit load profiles → refine/improve EV charging impact assessment





Ongoing and Future Work

- Upcoming partnership project to supplement POU data gaps in EDGE
- Additional potential use cases
- EDGE report
- Potential additional features:
 - Scenario selection based on different data years
 - Adding substation information
 - Investigating individual circuit impact analysis
 - Exploring other geographies (e.g. city boundaries)
 - Designing EDGE for mobile devices (i.e. smartphones and tablets)



Q&A and Public Comment



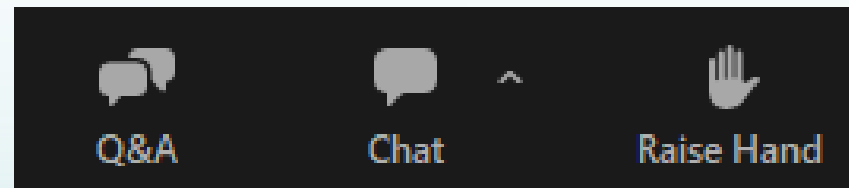
Public discussion

Zoom Participants:

- Use the “raise hand” feature to make verbal comments
- Use the Q&A feature to type in your question

Telephone Participants:

- Dial *9 to raise your hand
- Dial *6 to mute/unmute your phone line.





Discussion topics

- How can we improve the tool's methodology?
- What else would you like to see in the tool?
- How can we best address our data gaps and obtain better data?
- How can these results be best used by the public and grid planners?



Written comments

Electronic Commenting System

Visit the comment page for this docket at:

<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=19-AB-2127>

Comment by E-mail

Email: docket@energy.ca.gov

Subject Line: "EVSE Deployment and Grid Evaluation (EDGE) Tool"

All comments due by Wednesday, November 8, 2023 by 5pm



Thank You!

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