# Develop a Tool to Map The Preferred Locations for DC Fast Charging

PG&E EPIC Project 1.25 Overview

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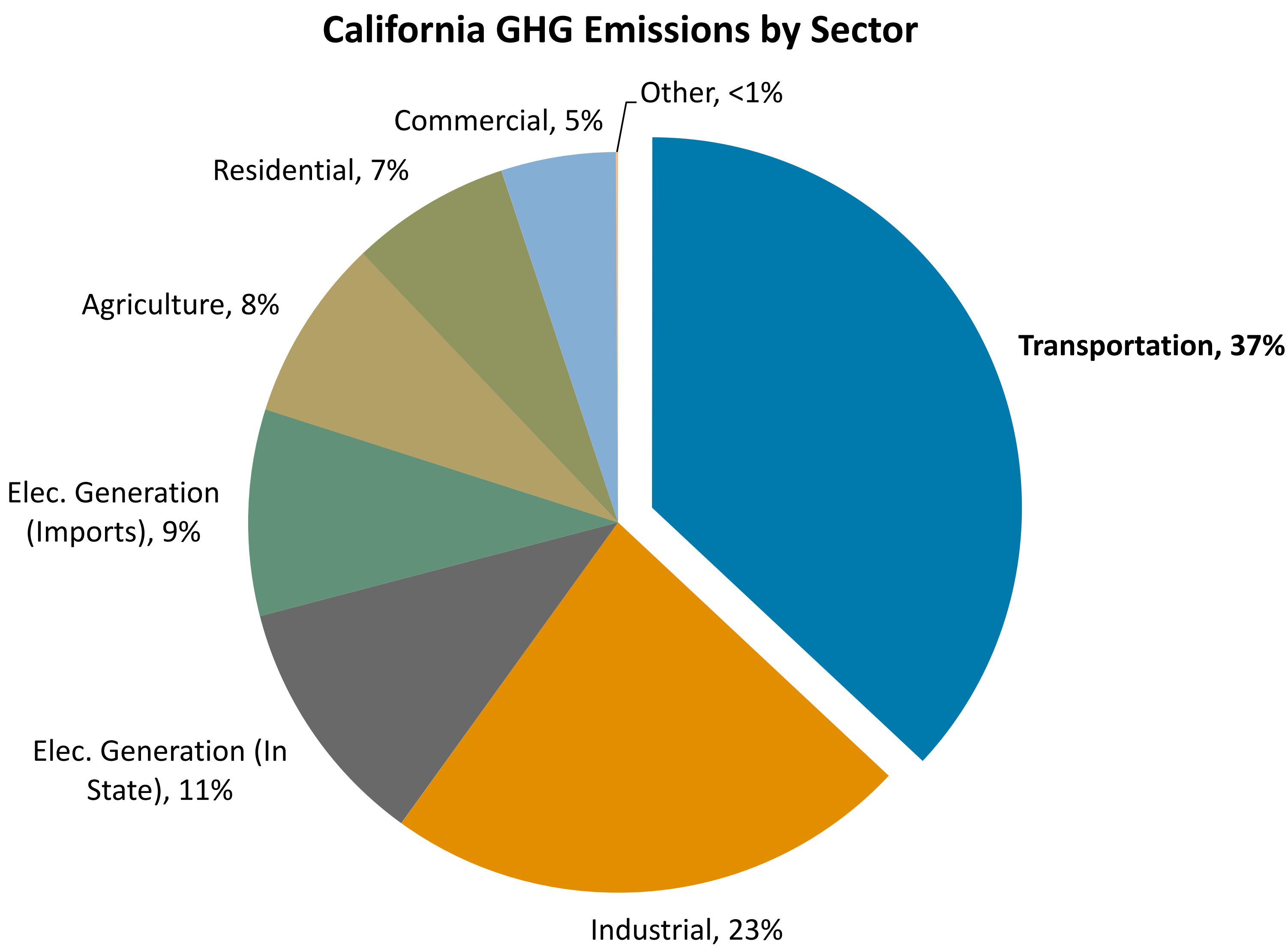
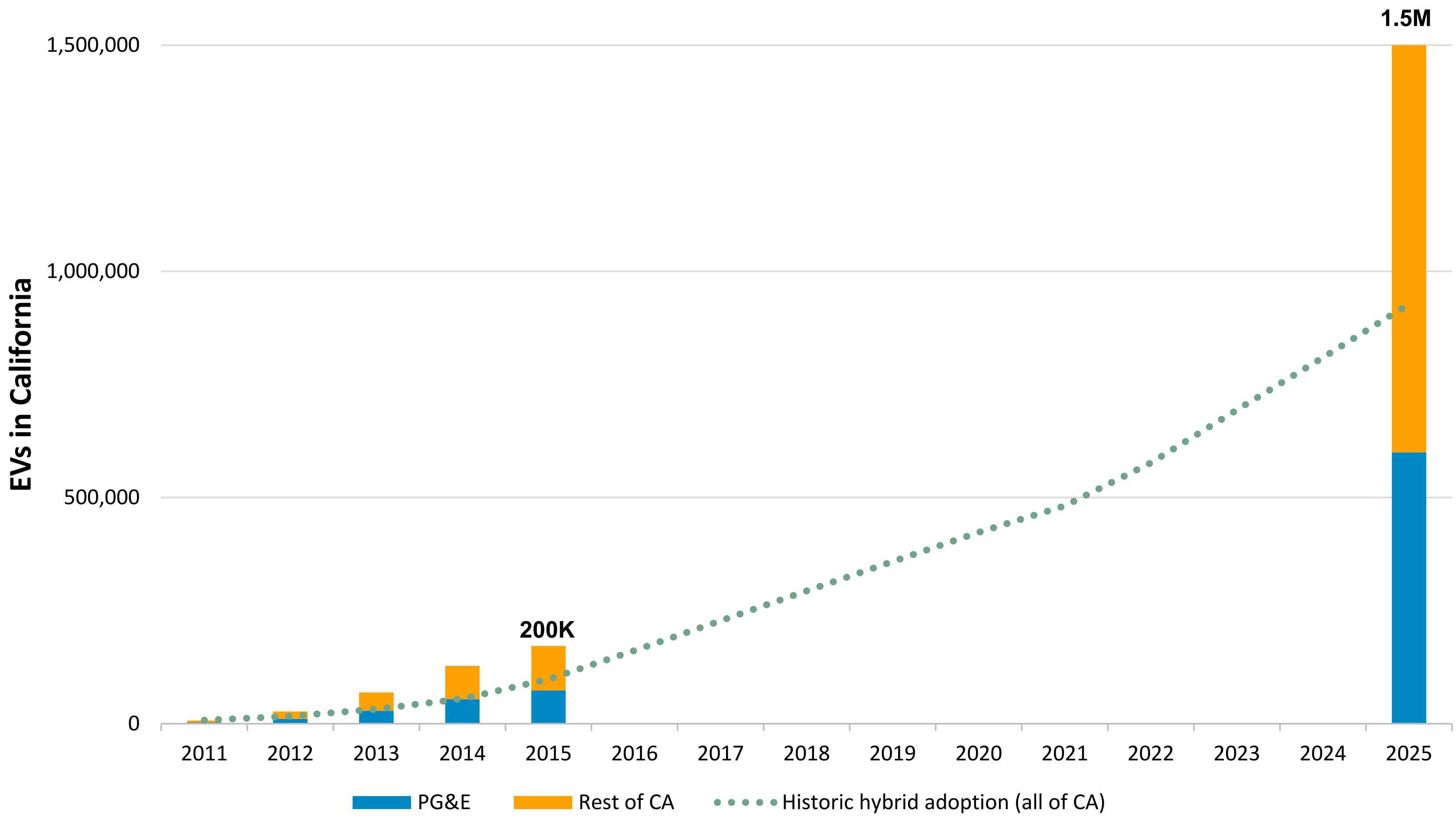
# Transportation Is the Single Largest Contributor to California GHG Emissions




Source: ARB California GHG Emissions Inventory, 2013

# Governor’s 2025 ZEV Goal



# Background: EV Charging

| Charger Type | Power | Voltage | Charge time (BEV) | Installed cost |
|---|---|---|---|---|
| AC Level 1 | 1.4 – 1.9 kW | 120V | 10 – 20 hrs | $0 – $500 (home) |
| AC Level 2 | 3.3 – 19.2 kW | 240V | 4 – 8 hrs | $1,000 – $2,500 (home/work)<br>$6,000 – $9,000 (public) |
| DC Fast Charging | 40 – 60 kW<br>(CHAdeMO & SAE CCS)<br><br>120 kW<br>(Tesla) | 480V | 20 – 40 mins | $150,000 – $250,000 (public) |

*For this presentation, 'charger' = 'EVSE' = standalone equipment used to deliver charge safely into the battery inside an EV

## Project Value

- Prior to this project, no one entity had evaluated where to site DCFCs by considering the input of three perspectives: the site host, the installer, and the driver.
- The PG&E EPIC Project provides a guide for PG&E and installers to identify DCFC locations more optimally based on factors such as cost, available service transformer capacity, traffic patterns, as well as site host and driver preference.

## Project Overview

1. Develop **best practices** in DC fast charger (DCFC) siting
2. Develop a transferable and repeatable **method** to identify and order sites based on driving patterns
3. **Identify and prioritize potential optimal sites** for individual DC fast chargers within PG&E's territory, based on the following approach:
   - A. Find the 300 most needed *locations* within PG&E's territory for DCFC installations in 2025
   - B. Estimate number of chargers needed at each location to support projected EV adoption in 2025

   Macro-siting (A–B)

   - C. Identify individual potential *sites* for planners to target based on non-exclusive factors such as driving patterns, distribution capacity, EV adoption, and support of disadvantaged communities
   - D. Provide a map & scoring tool to help on-the-ground planners prioritize these sites (scoring tool includes 26 weighting criteria options)

   Micro-siting (C–D)

PlugShare electric vehicle charging network

ITS UC DAVIS INSTITUTE OF TRANSPORTATION STUDIES

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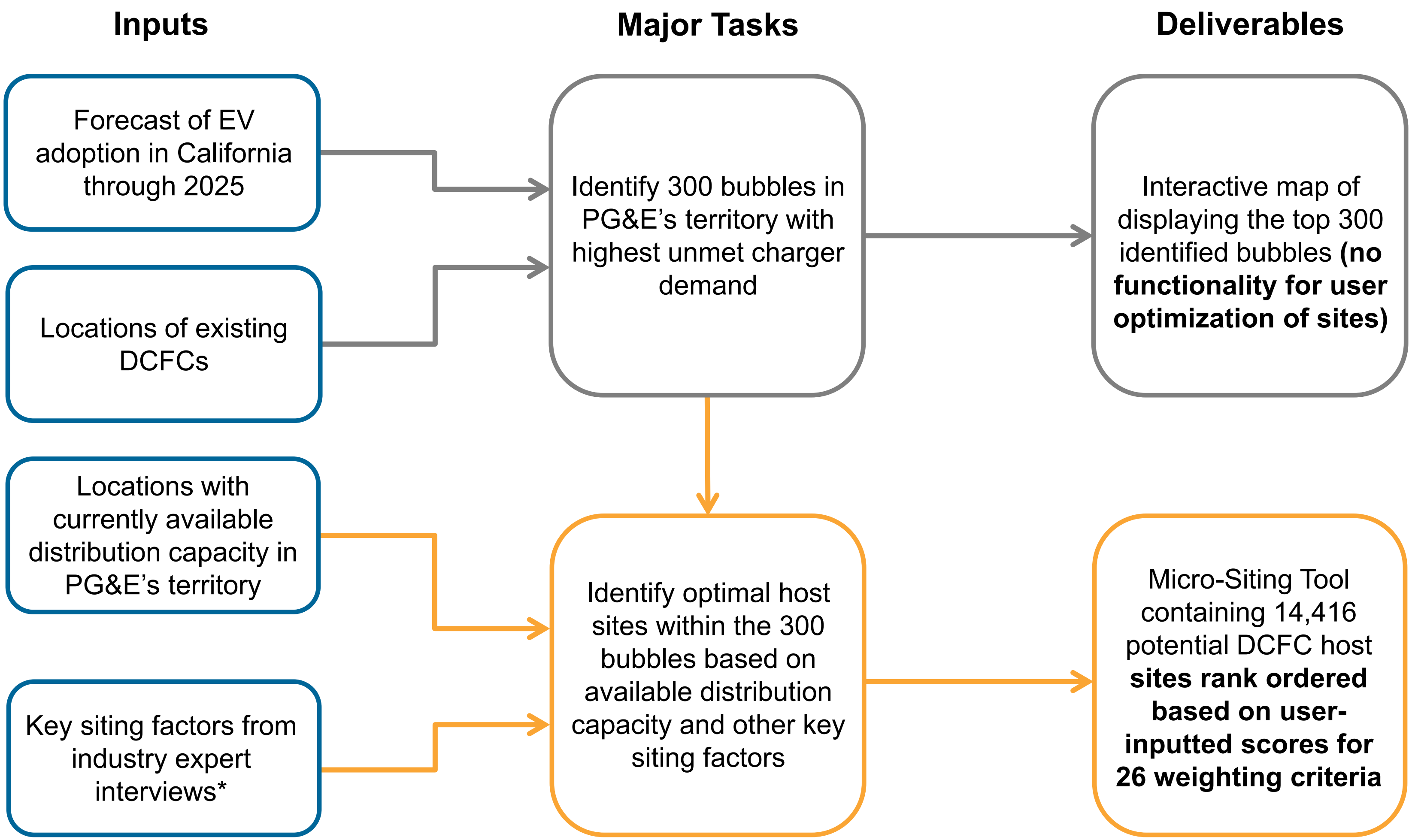
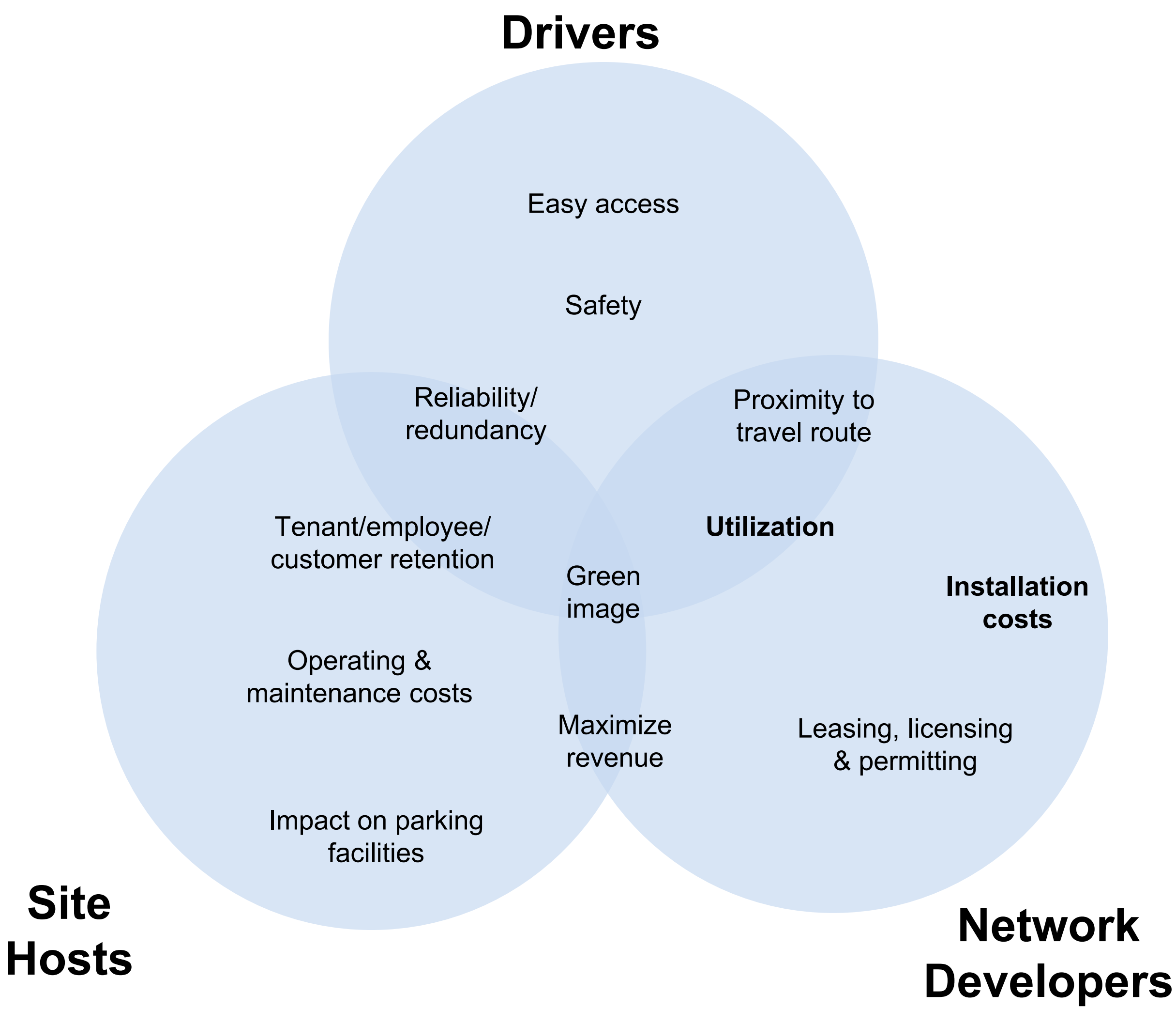
# Overview of Steps to Create the Interactive Map and Micro-Siting Tool

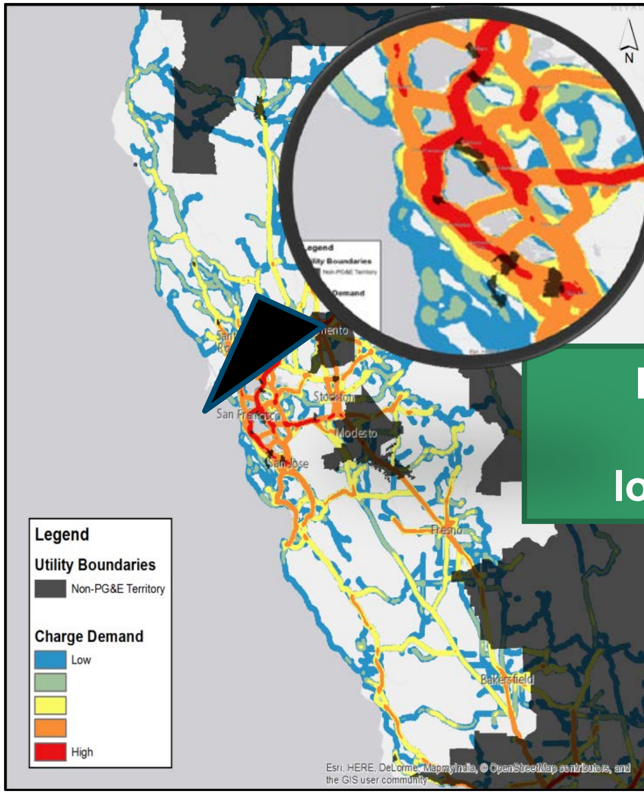



**Industry experts were asked to identify best practices and optimal types of sites, especially as they related to: (1) minimizing installation costs; (2) increasing EV adoption; and (3) supporting disadvantaged communities*

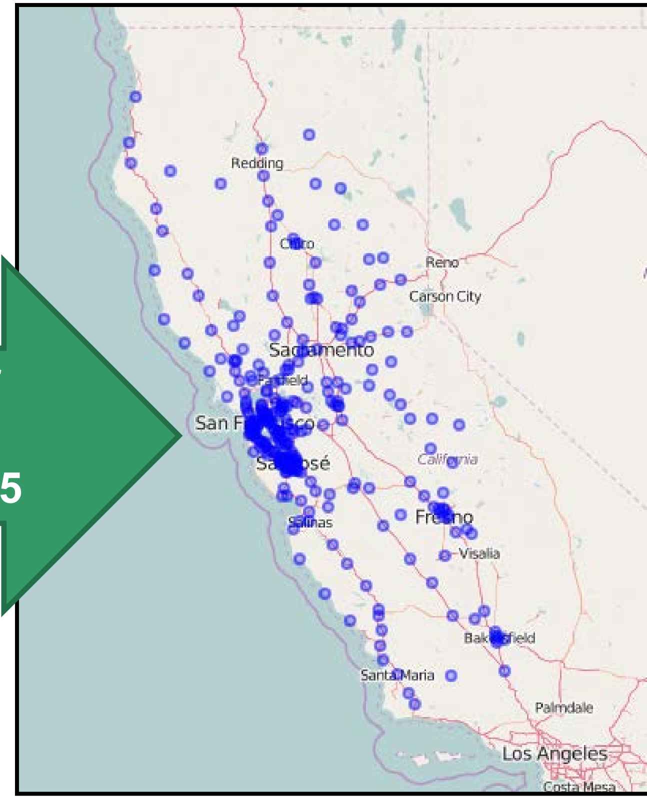
# Recommended Inputs Based on Interviews for DCFC Location Prioritization



# Identification of 300 Locations



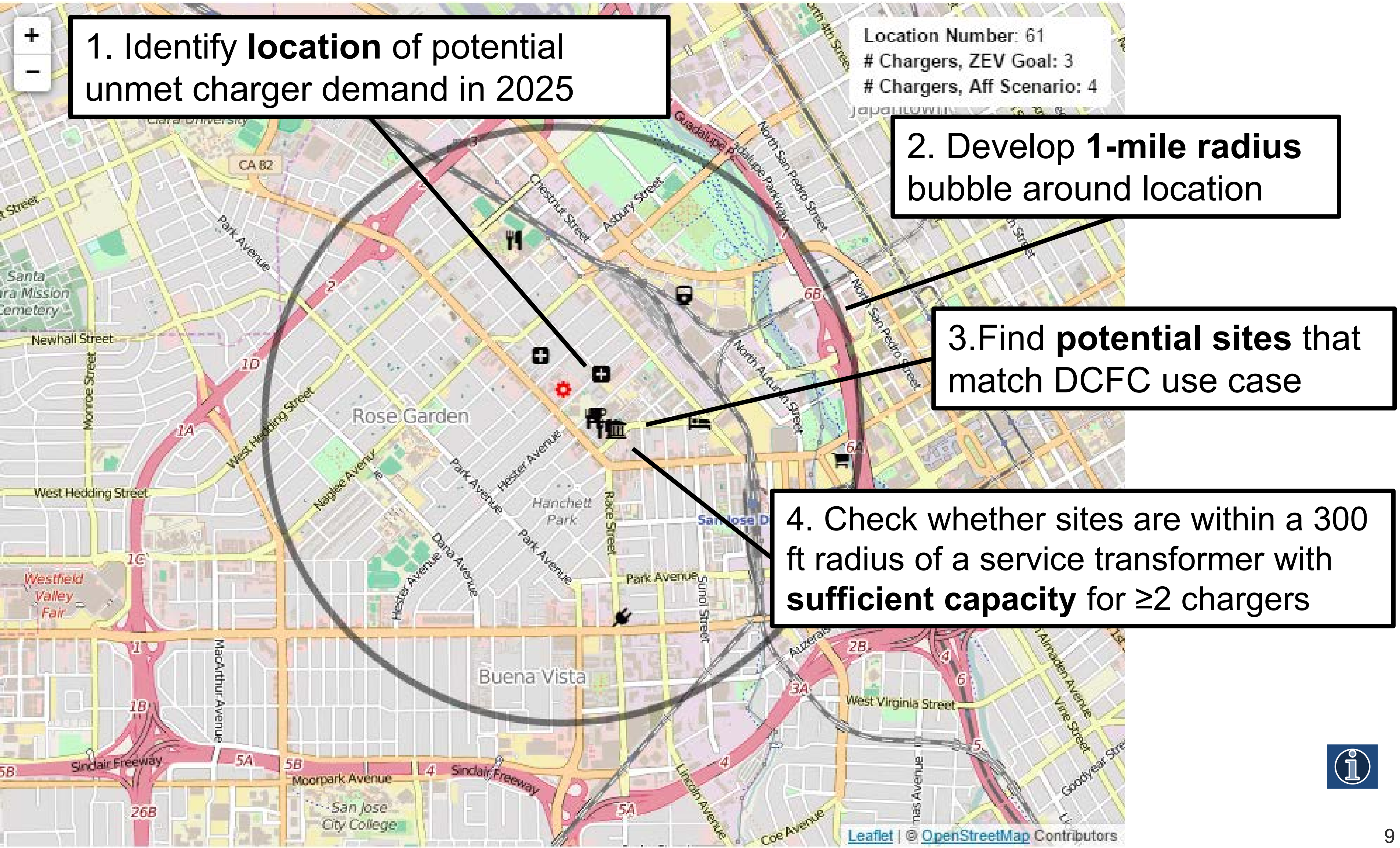

**Identification of high need locations for 2025**




UC Davis and PlugShare identified the top 300 locations where DCFCs are potentially needed through a travel-demand model and modified to account for existing infrastructure.

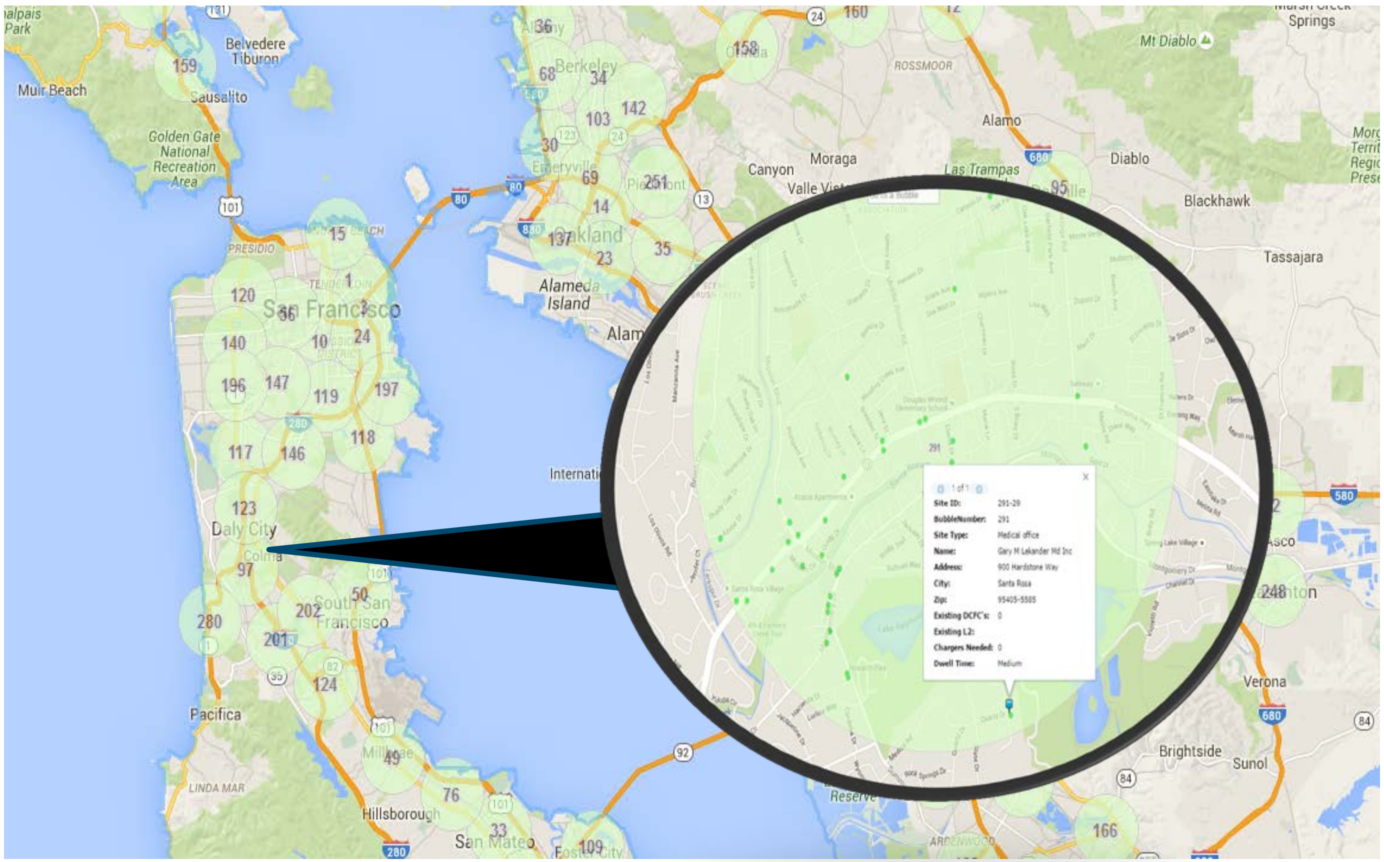
# Process for Identifying Suitable Sites Based on Service Transformer Capacity

**Output from this process is used as a filter in the Micro-Siting Tool**



# Online Interactive Map of Potential DCFC Site Hosts

- Interactive Map shows 14,416 sites in the top 300 ranked bubbles based on highest future unmet charging demand and high traffic corridor locations (no user inputs)
- Interactive Map provides raw inputs (14,416 site characteristics) to the Micro-Siting Tool, which allows DCFC developers to identify sites based on priorities



# DCFC Micro-Siting Tool Criteria Options

| Minimum Siting Conditions | Siting Criteria to Increase EV Adoption | Siting to Minimize Cost | Siting for Disadvantaged Communities |
| --- | --- | --- | --- |
| • Sufficient Spaces<br>• ADA<br>• Paved & Level<br>• 24/7 Access<br>• Ingress/Egress<br>• Safe<br>• Visible<br>• Restrooms<br>• Willing to Host<br>• Hazard | • Food<br>• Parking Capacity<br>• Parking Time Enforcement<br>• Shelter<br>• Premium Space<br>• Shop/Lodge<br>• Future Spaces<br>• Future Capacity<br>• Wifi | • Transformer Capacity<br>• Distance<br>• Surface | • CalEnviroScreen top PG&E quartile<br>• CARE Top Quartile<br>• Near Non-Luxury Multi-Unit Dwellings<br>• Minority-Owned |

# Lessons Learned

- **The DC Fast Charger Micro-Siting Tool and best practices described will guide DCFC installation plans for PG&E and statewide efforts**
  - Tool is specific to PG&E's territory, but other utilities and industry members can leverage the overall methodology developed through this project for identifying potential charging host sites
- **Thoughtful siting of EV charging infrastructure can reduce installation costs, improve site host acceptance, and maximize use from drivers**
  - Service transformer upgrades and trenching costs are the major drivers in installation costs (Micro-Siting tool includes 20 site selection filters to help planners minimize these costs)
- **Disadvantaged communities are best served by siting DCFCs according to 3 criteria:**
  - Placement of chargers within disadvantaged communities, proximity to multiple-unit dwellings, and proximity to minority-owned businesses
- **Within PG&E territory, 14,471 businesses, parking lots, and other locations match the DCFC use case**
  - Ultimately identified 300 one-mile radius locations within PG&E's territory, rank-ordered by need

# Conclusions

**Post Project Plans**

- Leverage project results to test case using recently CEC-funded DCFC installations

**Key Takeaways for Industry**

While the results from the interactive map are specific to and applicable to PG&E's territory, the methods for developing the map and Micro-Siting Tool, as well as the best practices in siting, are transferrable to other utilities and states.

**Report:** www.pge.com/epic

**Interactive Map:** www.pge.com/epic-project-dcfastcharging

# Questions?

# Appendix

# Gathering Expert Opinions & Experiences

## Extensive review of projects to-date, plus interviews/surveys of 20 orgs:

- ***Charging network planners & utilities:***
  - Charlie Botsford, Business Development, ***AeroVironment***
  - Terry O'Day, Vice President, California, ***NRG EVgo***
  - Ian Thompson, SVP Global Solutions Consultancy, ***Kalibrate***
  - Bill Boyce, Supervisor, Electric Transportation, ***SMUD***
  - Marvin Moon, Director of Engineering and EV Program Manager, ***LADWP***
  - Ashley Horvat, VP Strategic Initiatives, PlugShare, formerly Chief EV Officer, ***State of Oregon***
  - Thomas Garetson, Director, Electric Transportation Engineering Corp and Director, ***Ecotality North America***
- ***Researchers:***
  - Anand Gopal, Scientist, and Colin Sheppard, Research Associate, ***Lawrence Berkeley National Laboratory***
  - David Carter, Senior Research Engineer, and Jerome Carman, Research Engineer, ***Schatz Energy Research Center***
  - Jim Francfort, Lead Advanced Vehicle Researcher, ***Idaho National Laboratory***
  - Marc Melaina, Senior Engineer, ***National Renewable Energy Laboratory***
- ***Industry:***
  - John Halliwell, Senior Project Manager, ***Electric Power Research Institute***
  - Josh Boone, Deputy Executive Director, ***California Plug-in Electric Vehicle Collaborative***
- ***Auto companies:***
  - Alex Keros, Manager and Senior Project Engineer, ***General Motors***
  - Chris Walt, Program Manager – EV Infrastructure, ***Tesla Motors***
  - Mike Tinskey, Director of Vehicle Electrification and Infrastructure, ***Ford Motor Company***
  - Stephen Kosowski, Manager, Long Range Planning and Strategy, ***Kia Motors America***
- ***Environmental justice groups:***
  - Joel Espino, Environmental Equity Legal Counsel, ***Greenlining***
  - Bahram Fazeli, Director of Research and Policy, ***Communities for a Better Environment***
- ***Host site:*** Daniel Schmidlkofer, Maintenance Manager, ***Fred Meyer***

# Place Types That Match DCFC Use Case

| Dwell time | Site type |
|---|---|
| **Short dwell time** | Bakery |
| | Bank |
| | Drug store |
| | Gas station |
| | Grocery or convenience store |
| | Health food store |
| | Post office |
| **Medium dwell time** | Clothing store |
| | Court |
| | Department store |
| | Electronics store |
| | Environmental agency |
| | Furniture, home appliances |
| | Government building |
| | Gym or health club |
| | Hospital |
| | Library |
| | Medical office |
| | Movie theater |
| | Museum, performing arts, or art gallery |
| | Parking lot |
| | Restaurant or café |
| | Retail store |
| | Sports field or stadium |
| | Supermarket |
| | Tourist attraction or recreation site |
| | Utility regulator |

| Dwell time | Site type |
|---|---|
| **Long dwell time** | Airport |
| | Botanical garden, zoo, or aquarium |
| | College or university |
| | Lodging |
| | Railway station |
| **Not classified** | Existing DCFC, not elsewhere classified |
| | Existing Level 2, not elsewhere classified |