Southern California Zero Emission Truck Infrastructure (ZETI) Study

December 13, 2023

WWW.SCAG.CA.GOV

Welcome

What are you hoping to get out of today's TAC meeting?

Please provide a one-word answer in the chat, thank you!

Welcome

Jonathan Raspa

SCAG Project Manager

Re-introducing the Project Team

SCAG
INNOVATING FOR A BETTER TOMORROW

CAMBRIDGE SYSTEMATICS

C+R
ASSOCIATES

ICF

redhillgroup
THE POWER OF INSIGHT

Tioga

BERKELEY LAB

Re-introducing TAC Member Organizations

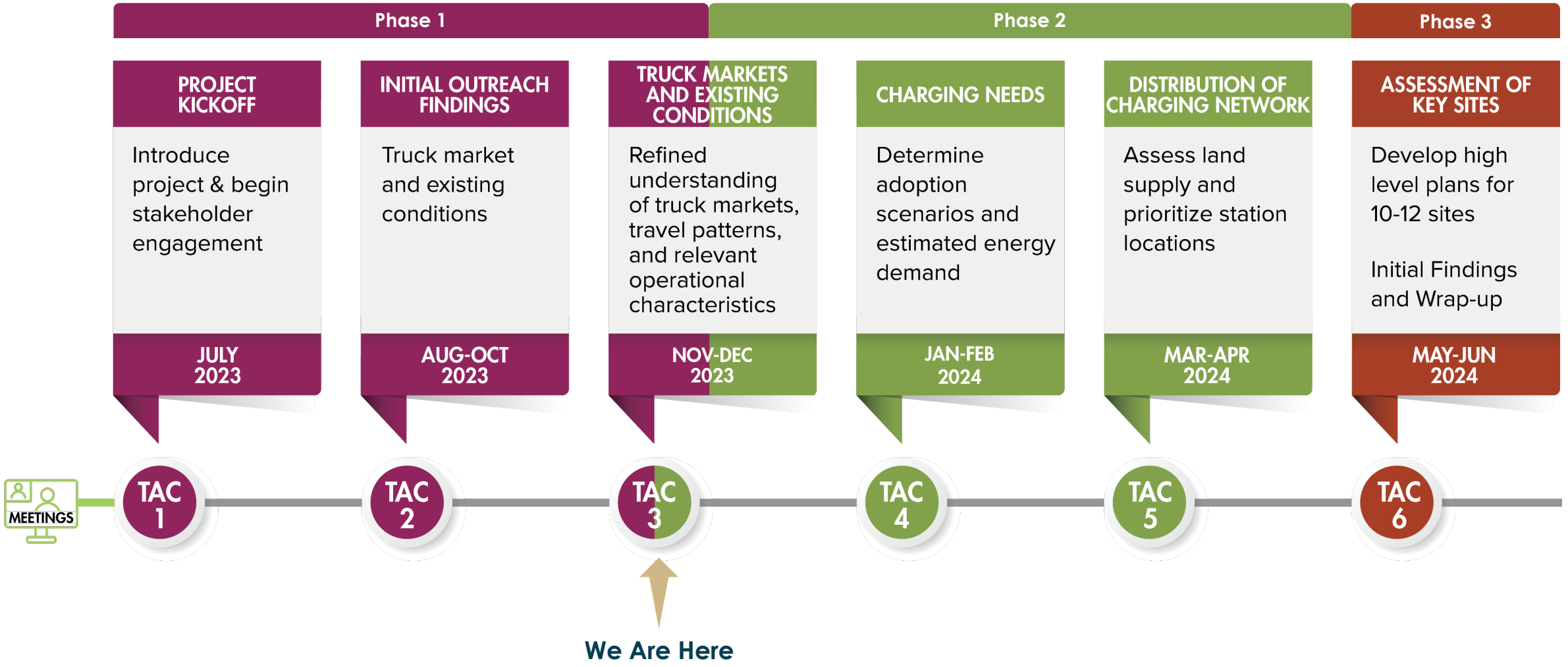
Technical Advisory Committee Meeting #3

Agenda

- Welcome and Introductions
- Project Progress to Date
- Deeper Data Dive
- Siting Criteria
- TAC Member/Industry Presentation
- TAC Engagement/Feedback
- Next Steps

PROJECT PROGRESS TO DATE

Project Phase Review, detail



Recap of TAC #2 meeting Next Steps

- Completing survey, focus group and interviews by end of October 2023 
- Continue to convene Technical Advisory Committee, four meetings remaining through June 2024 
- Continue to develop HEVI-LOAD charging requirements analysis; develop future year demand forecasts by December 2023 
- Finalize Framework and workflow for Model Implementation by January 2024 

Project Progress to date, Phases

LITERATURE REVIEW, OUTREACH, AND SURVEY

- ☑ Completed the literature review
- ☑ In process of Surveying Truck fleet
- ☑ Conducting Focus Groups and Stakeholder Interviews
- ☑ Held First Technical Advisory Committee Meeting

PHASE 1

TECHNICAL WORK

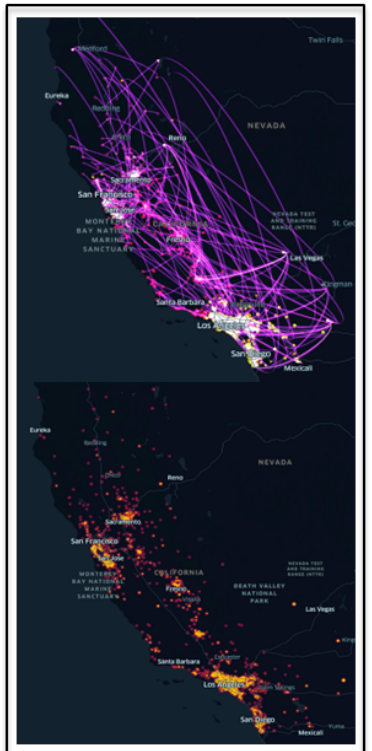
- ☑ Completed Truck GPS Data Analysis
- ☑ Completed Truck Trip Expansion
- ☑ Identified Market Segments
- ☑ Incorporated Payload Information

PHASE 2

DEEPER DATA DIVE

Methodology – HEVI-LOAD Analysis Workflow

All results are preliminary for discussion only and confidential



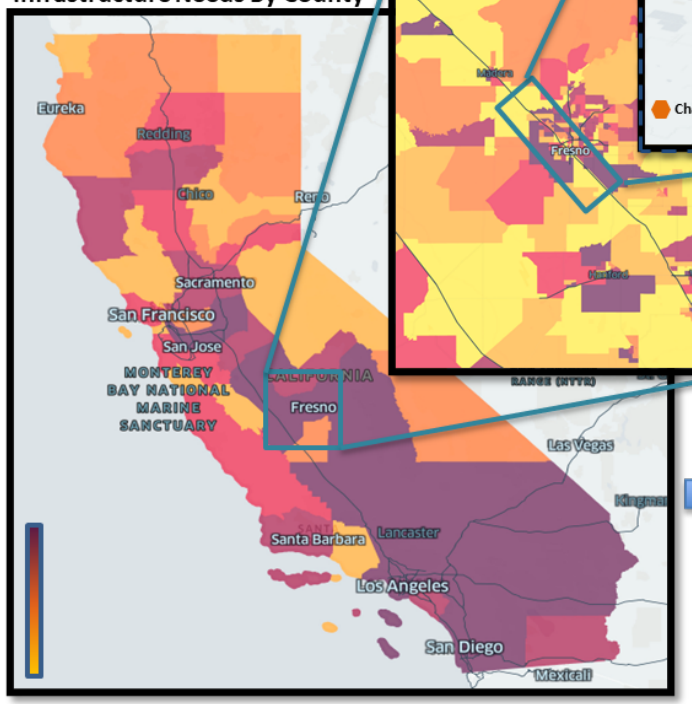
HEVI-LOAD Inputs

- MDHD travel demand (trips),
- parking and infra. location,
- truck GPS data,
- adoption scenarios,
- vehicle specifications, etc.

HEVI-LOAD Agent-Based Simulation

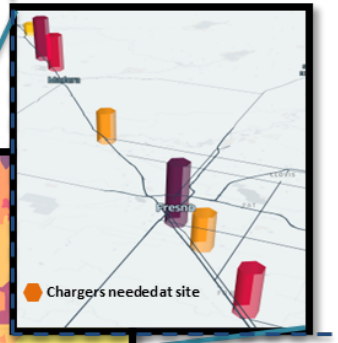
- Integrated driving-parking-refueling behavior modeling and simulation
- Smart/managed charging strategies

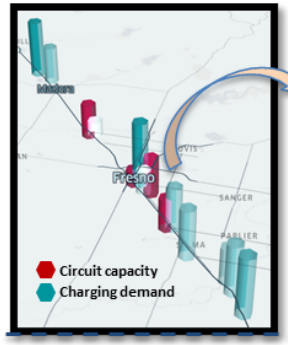
Infrastructure Needs By County

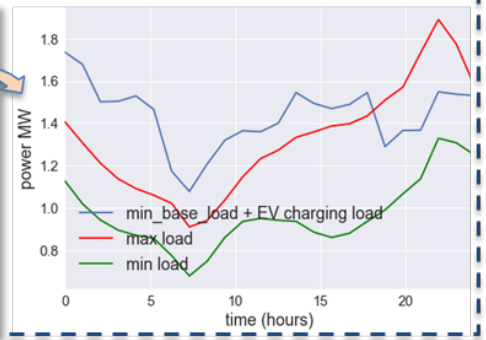


By TAZ

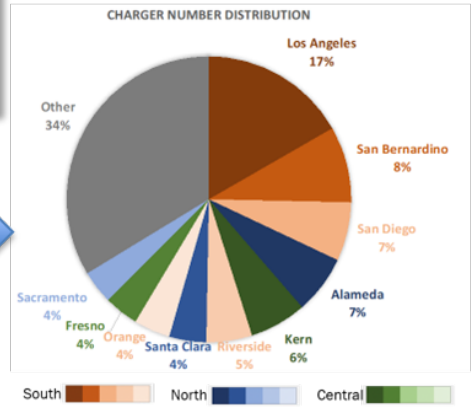
Infrastructure Assessment at the Site Level

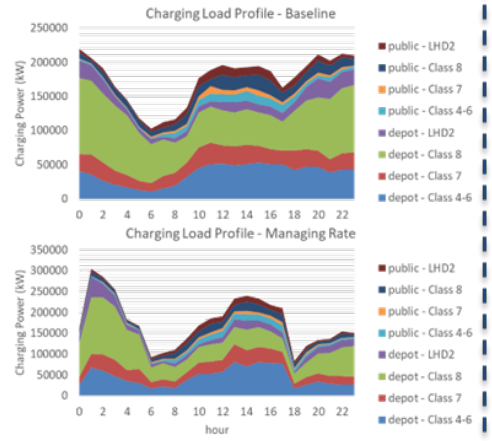






Infrastructure Assessment at the State and County Level





HEVI-LOAD Simulation for US (Preliminary Results)

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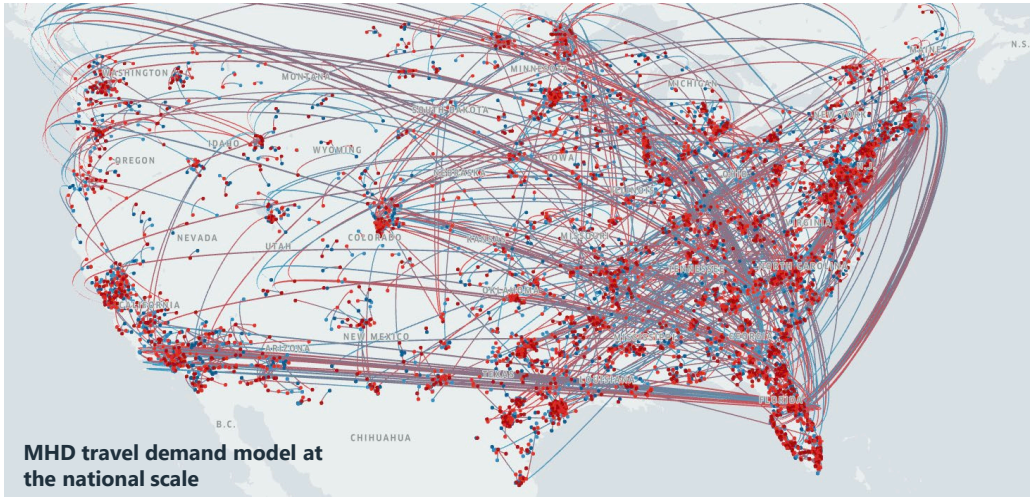
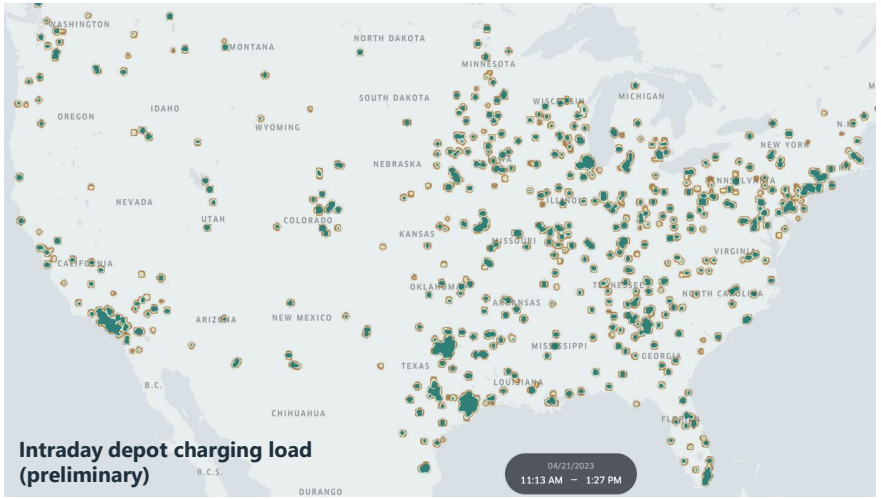
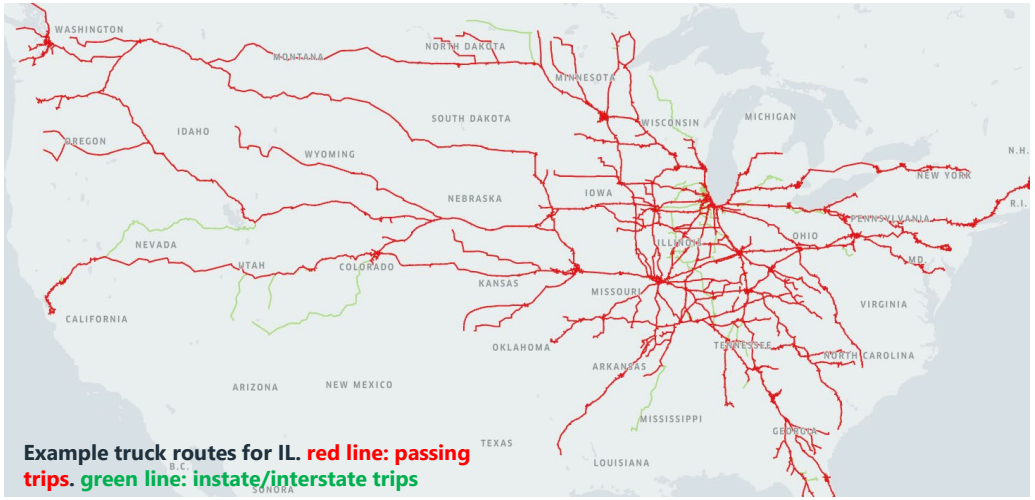


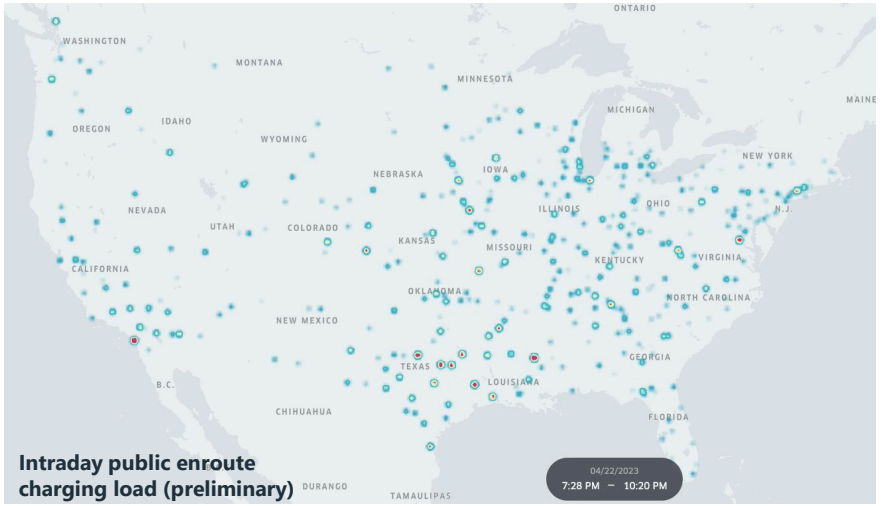
MHD travel demand model at the national scale



Intraday depot charging load (preliminary)



Example truck routes for IL. red line: passing trips. green line: instate/interstate trips



Intraday public enroute charging load (preliminary)

Infrastructure and Load Results (Preliminary)

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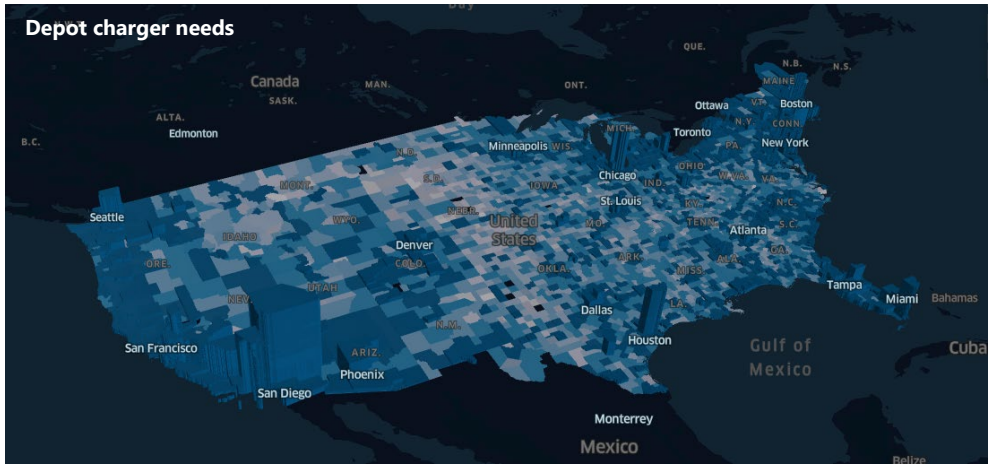
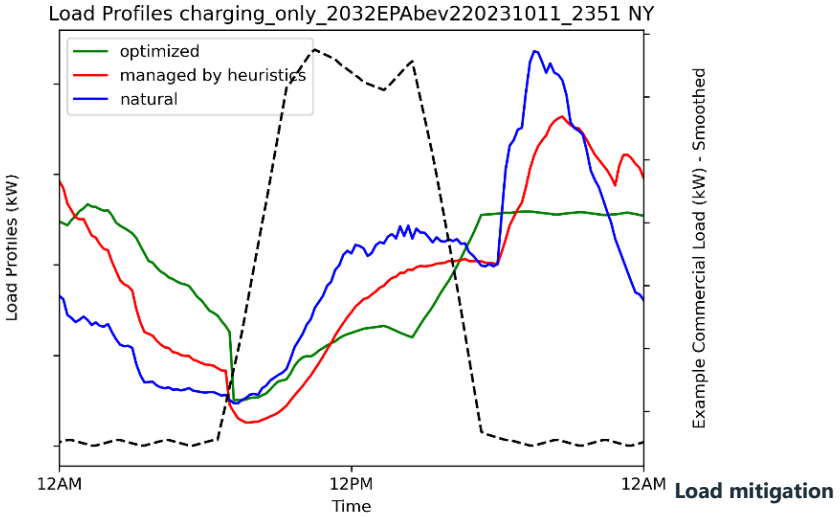
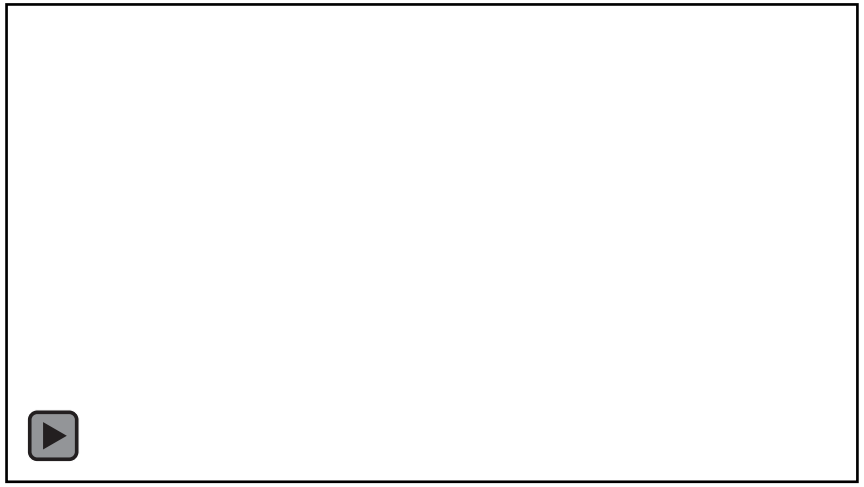


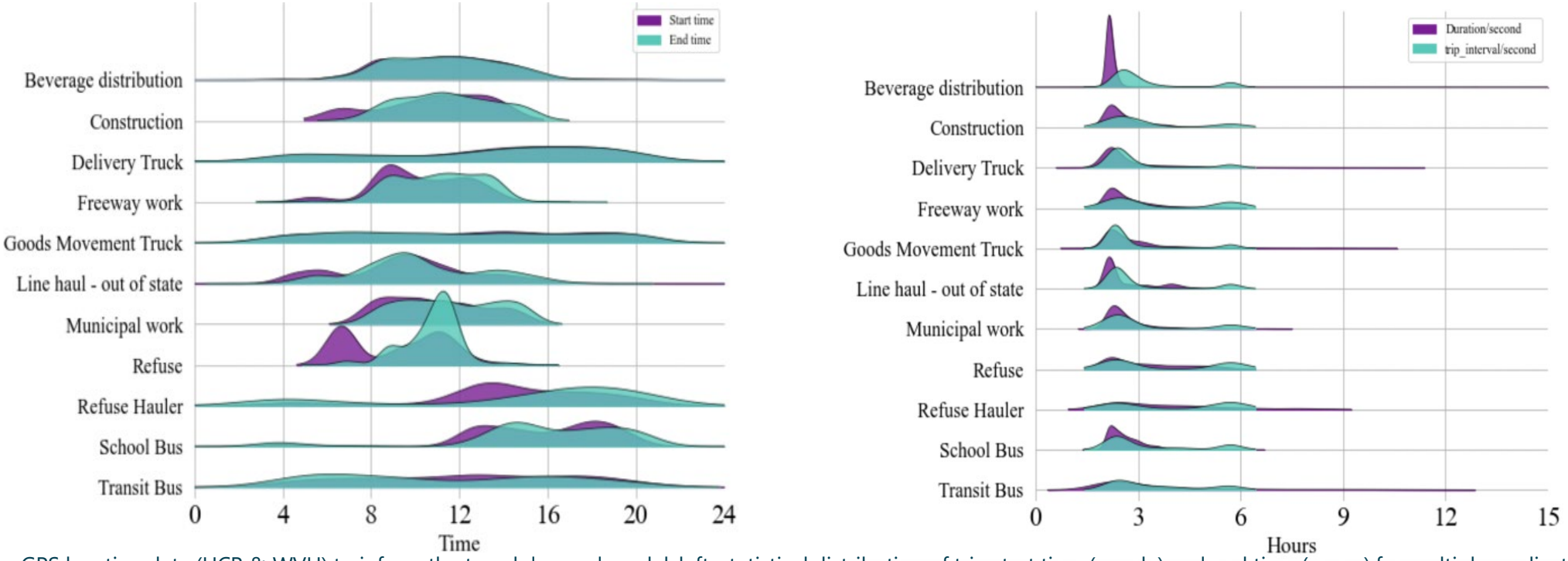




Trip and Travel Demand Forecast

All results are preliminary for discussion only and confidential

- Calibrate the travel demand models as inputs to HEVI-LOAD Simulation
  - Leverage the NHTS Truck OD data and California Statewide Travel Demand Model (CSTDM), etc.
  - Characterize trip behaviors with real-world GPS location datasets
  - Calibrate trip start time, origin/destination, distance, etc.

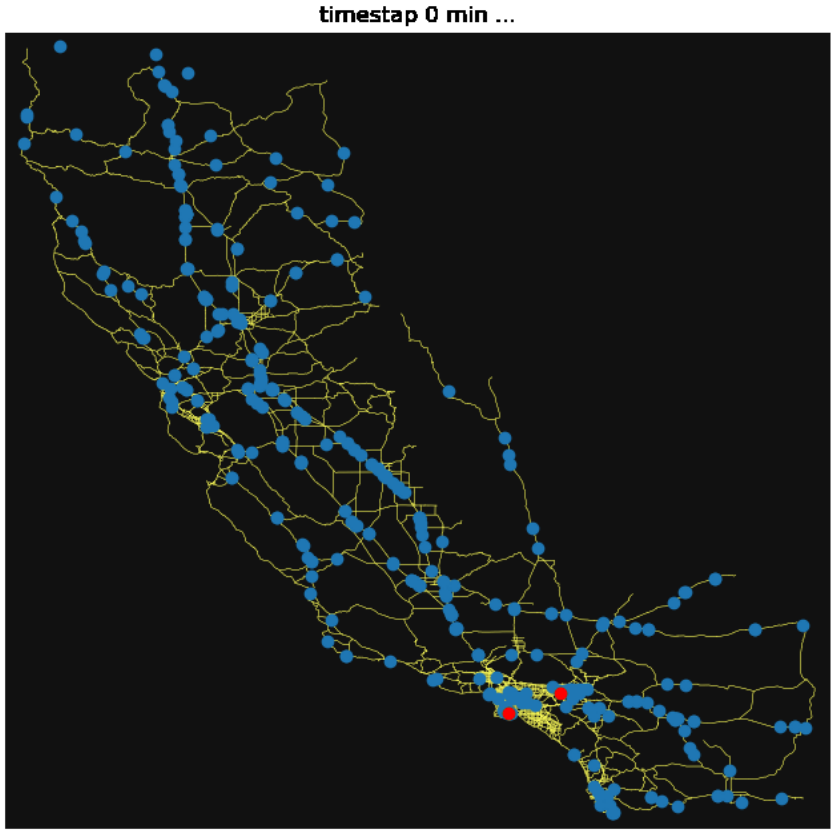


GPS location data (UCR & WVU) to inform the travel demand model, left: statistical distribution of trip start time (purple) and end time (green) for multiple applications, right: statistical distribution of trip duration (purple) and trip interval duration (green)

Simulation Approach

All results are preliminary for discussion only and confidential

- We incorporate aggregated ZE vehicle adoption information for infrastructure needs and load profiles at county-level both today and for the future. Integrated with CEC level future scenarios.
- Then, we develop a Bottom-Up simulation that incorporates granular geographical resolution, and accounts for road networks, and incorporates rider/traveler parking information.
- The Bottom-Up approach helps us assess future opportunities for public charging with greater specificity

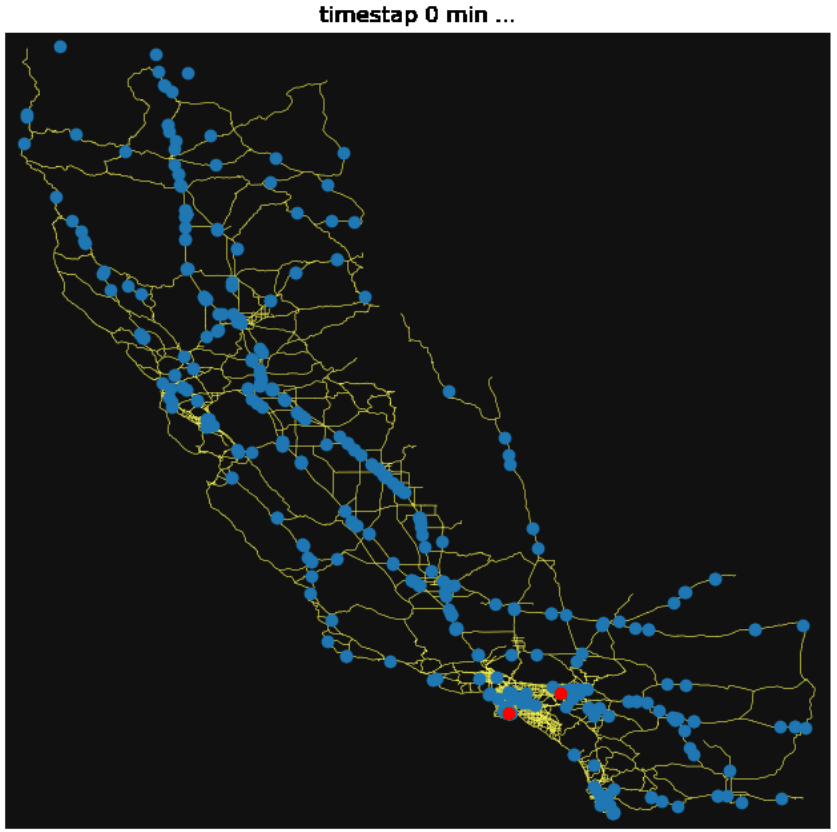


Activity Simulation of selected MDHD vehicle applications: integrated driving-routing-parking-charging scenarios in CA. Red dots: moving MD/HD vehicles being simulated; Blue dots: hwy entry points for the candidate infrastructure deployment locations, such as truck stops.

Bottom-up Simulations

All results are preliminary for discussion only and confidential

- Prepare inputs for the simulation
  - Road network
  - Travel demand – MD/HD trips with origins, destinations, and trip start times
  - Link truck trips to capture daily travel estimates
  - Critical/candidate locations: truck stops, rest areas, etc.
  - Calibrate behaviors using real-world GPS & duty-cycle data
- Enable decision-making, routing and decision-making capability for each vehicle
  - Compute shortest distance/travel time routes
  - Provide flexibility for more customization for future scenarios, e.g., select optimal en-route charging stations



Activity Simulation of selected MDHD vehicle applications: integrated driving-routing-parking-charging scenarios in CA. Red dots: moving MD/HD vehicles being simulated; Blue dots: hwy entry points for the candidate infrastructure deployment locations, such as truck stops.

Primary Fueling Models for Trucks

Depot/Overnight Charging

- Mainly used for vehicles with shorter, regional routes that return to a “home base” to charge.

On-Route/Opportunity Charging

- Mainly used for vehicles with longer, interregional routes to charge while “on-route”

H2 Fueling

- Used for hydrogen vehicles

Scenario Development

Global Adoption Rates

- Horizon Year
- Electric vs. Hydrogen

Travel Behavior Adoption Rates

- Market Segment
- Depot vs. En-Route Charging
- State of Charge – Beginning of Day

Integrating HEVI-LOAD Into the Project

- The HEVI-LOAD model will help develop and refine future scenarios to create a range of future needs for charging infrastructure over different horizon years
- The data will help us link travel demand with energy capacity
- The model will help refine site selection, filter for siting criteria for public charging infrastructure

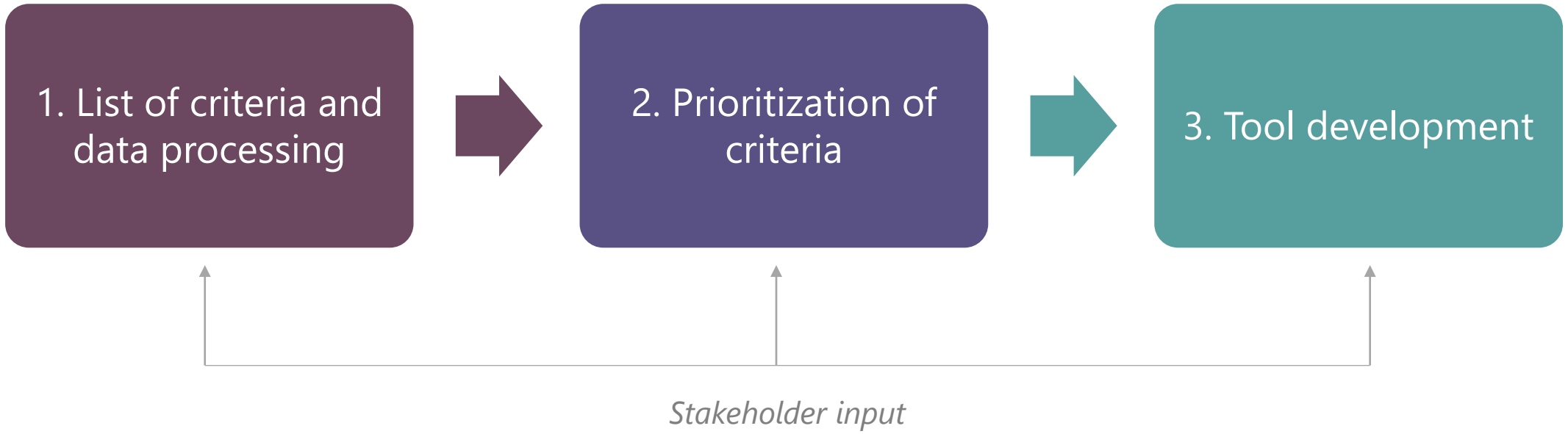
HEVI-LOAD Enhancements for this Effort

- Integrate linked truck travel to better understand when/where trucks may run out of charge over the course of a day.
- Ability to run multiple future scenarios that better reflects uncertainty in ZEV truck adoption
- Develop modules specific for hydrogen charging – which will be mostly en-route charging

SITING CRITERIA

Siting Analysis Overview

- Multi-criteria decision making analysis (MCDA) approach to prioritize sites



Zero Emission (ZE) Vehicle Infrastructure Siting Criteria

- Five main groups of siting criteria for EV charging and hydrogen fueling infrastructure:

Utilization	Land	Equity	Grid capacity	Environmental

Utilization Criteria

- Utilization criteria refers to estimating demand for charging or hydrogen fueling with the goal of maximizing economic viability

Vehicle Volume

How many trucks pass by?

Daily Travel

What is the total daily mileage?

Land Criteria

- Land criteria encompasses availability, compatibility, value, ownership, demand, as well as community impacts

Existing Parking

Is there existing truck parking?

Land Space

Is there enough space?

Scalability

Can the site be expanded in the future?

Land Price/ Economic Vitality

How does the land price compare to other locations?

Land Use & Zoning

Are there any zoning constraints?

Proximity to ZEV Infrastructure

Is there other ZE infrastructure in close proximity?

Amenities

Are there the essential amenities for truckers?

Access, Congestion, Safety

Is the site accessible to trucks? Will it impact congestion and community safety?

Proximity to Hydrogen Fuel Chain

How close the site is to H2 supply?

Equity Criteria

- Equity criteria ensures that disadvantaged communities (DAC) are not adversely impacted and benefit from ZEV infrastructure

Proximity to DAC

How close is this site to a DAC? Is it going to increase truck traffic in a DAC?

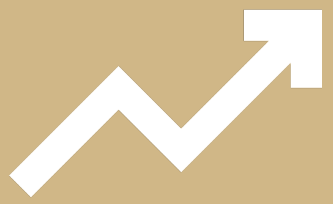
Direct Benefit to DAC

Will the placement of the site result in higher proportion of ZE trucks in DACs?

Grid Capacity Criteria

- Grid capacity considers the ability to connect to the existing electrical grid, expand in the future, and recommends integrating distributed energy resources (DER), such as solar panels or battery storage, into station development to ensure resiliency and avoid costly grid upgrades

Upgrade/ Scalability



Does the site have enough electrical infrastructure capacity to host chargers? Could the site be expanded in future?

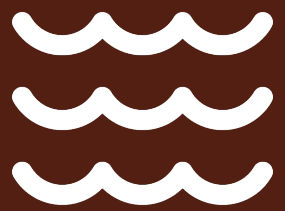
DER Integration

Can the site host DER such as solar panels, battery storage?

Environmental Criteria

- Environmental criteria considers potential construction, operational impacts and community impacts on charging station development sites

Flood Risk



Is the site located in an area with high flood hazard or potential sea level rise impacts?

CEQA / NEPA

Is the site required to undergo the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) review?

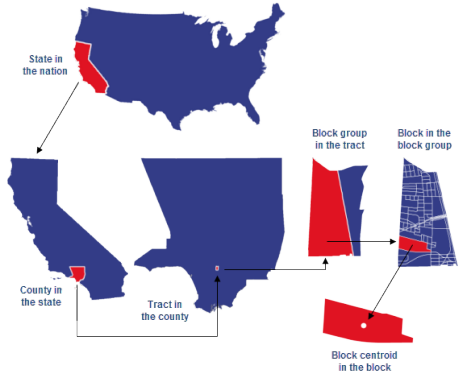
Brownfields

If a site is a brownfield, can it be redeveloped?

Data Processing

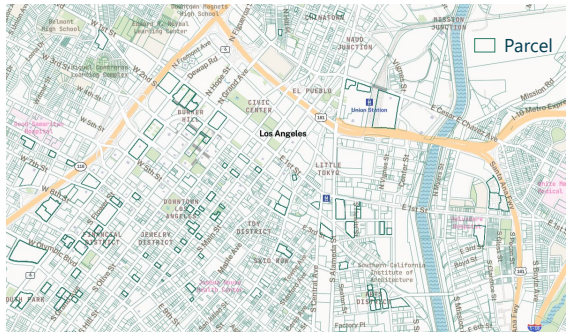
- Level of Analysis

Census geography units



Source: https://learn.arcgis.com/en/related-concepts/united-states-census-geography.htm

Parcels-example



Source: https://app.regrid.com/us/ca#b=admin

Census block group level screening

- *Utilization, equity, land criteria*

High priority parcel analysis

- *Environmental, land, grid capacity criteria*

Candidate areas and site typologies

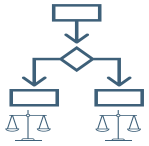
Prioritization of Criteria

- Collective activity to develop variable prioritization which will be treated as guiding principles

Develop criteria groups that will be distributed to stakeholders to rate

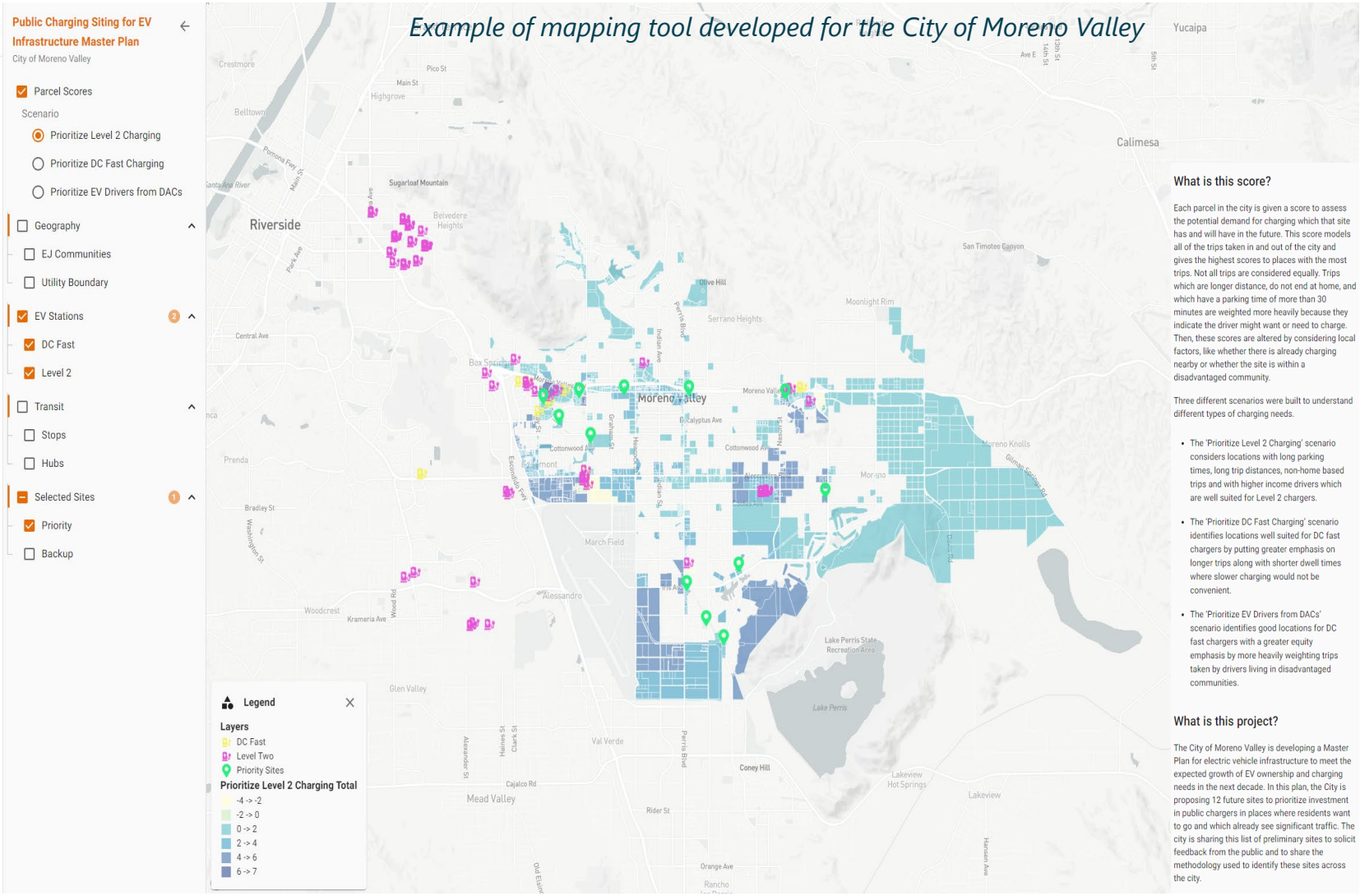
Stakeholders assign weights to criteria groups (0-100)

Stakeholders assign weights to sub-criteria within each criteria group



Stakeholders rate location features for each sub criterion relative to others (scale of 0-1)

Tool Development



Example of mapping tool developed for the City of Moreno Valley

- ❑ Approach for assessing candidate sites and their alignment with typologies
- ❑ Allow users to apply different weight configurations/ scenarios

Example scenarios:

- *Prioritize cost effectiveness*
- *Prioritize demand coverage*
- *Prioritize grid resilience and energy independence*
- *Prioritize public locations*
- *Prioritize depot/overnight charging*
- *Prioritize DC fast charging deployment*
- *Prioritize equity and community benefits*

- ❑ Has to be updated as land-use changes and policies are modified

TAC MEMBER/INDUSTRY PRESENTATIONS

TA Ontario Truck Charging Station

December 13, 2023

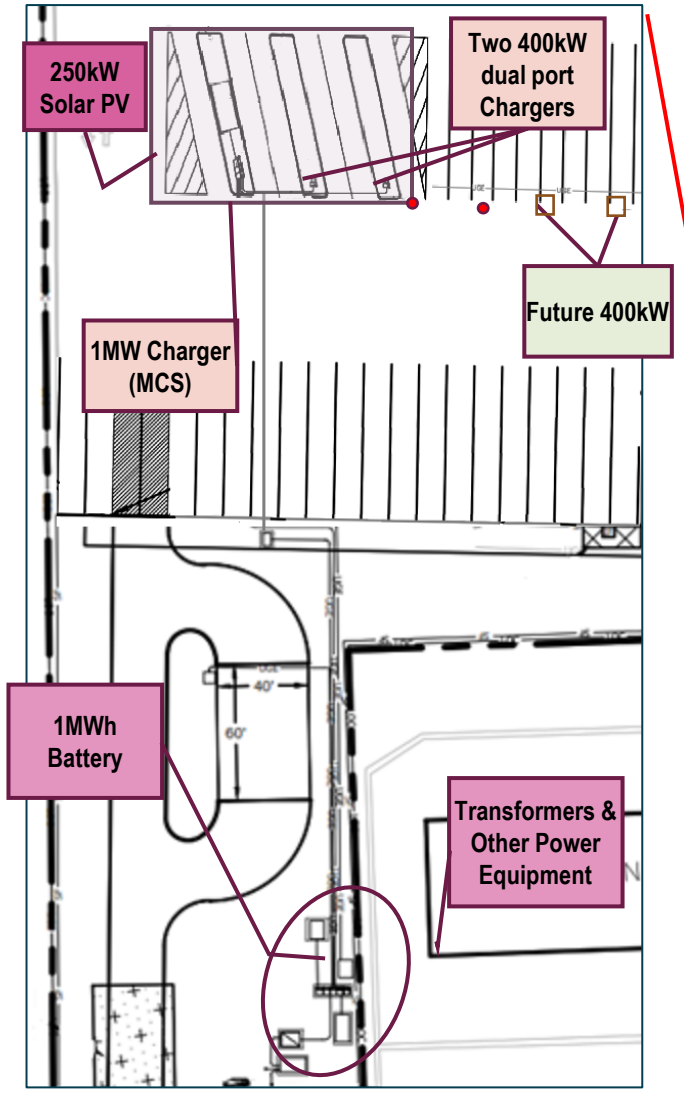
Tony Zamora

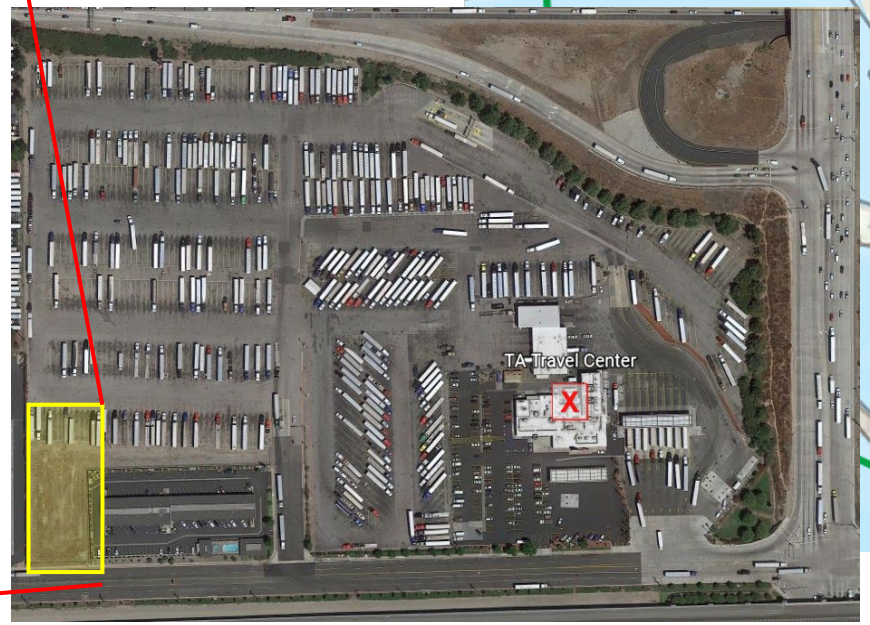
TravelCenters of America – a bp brand

- Est 1972, acquired by bp in 2023
- 18,000 team members
- 300+ locations in 48 states

- Offering:
  - Diesel and Gasoline sales
  - 600+ restaurants
  - Truck Maintenance and Repair
  - Travel Stores
  - Amenities and services for drivers
  - Car/Truck Parking
  - EV chargers for cars and light trucks

eTA Ontario Truck Charging Station





TA Ontario Truck Charging Station

PROJECT GOALS:

- Support fleet customers/partners in their adoption of ZEVs
- Support research & development of megawatt fast chargers
- Support local workforce development for electric truck service
- Prove a business case for public-access charging for heavy-duty electric trucks
- Identify and share learnings throughout the project life-cycle

GRANT FUNDING:

- CEC EPIC Grant: **$4MM**
- CEC-EPRI eTRUC funds: **$1MM**

PARTNERS:

EPRI ELECTRIC POWER RESEARCH INSTITUTE

STATE OF CALIFORNIA ENERGY COMMISSION

SOUTHERN CALIFORNIA EDISON

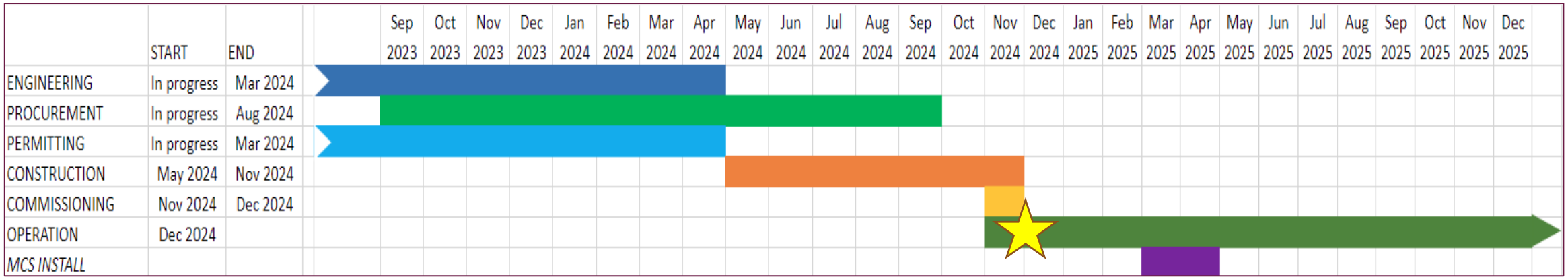
WGI ARUP

CORE STATES GROUP

XENDEE

bp pulse

MOMENTUM



Lessons Learned

- **More time. More money.**
- **Engage local Utility early**
- **Engage a competent EPC contractor early**
- **Procure long lead equipment ASAP**
- **Design to fit your business**
- **Public-Private Partnership is Key (and not always easy)**

QUESTIONS?

For More Information…

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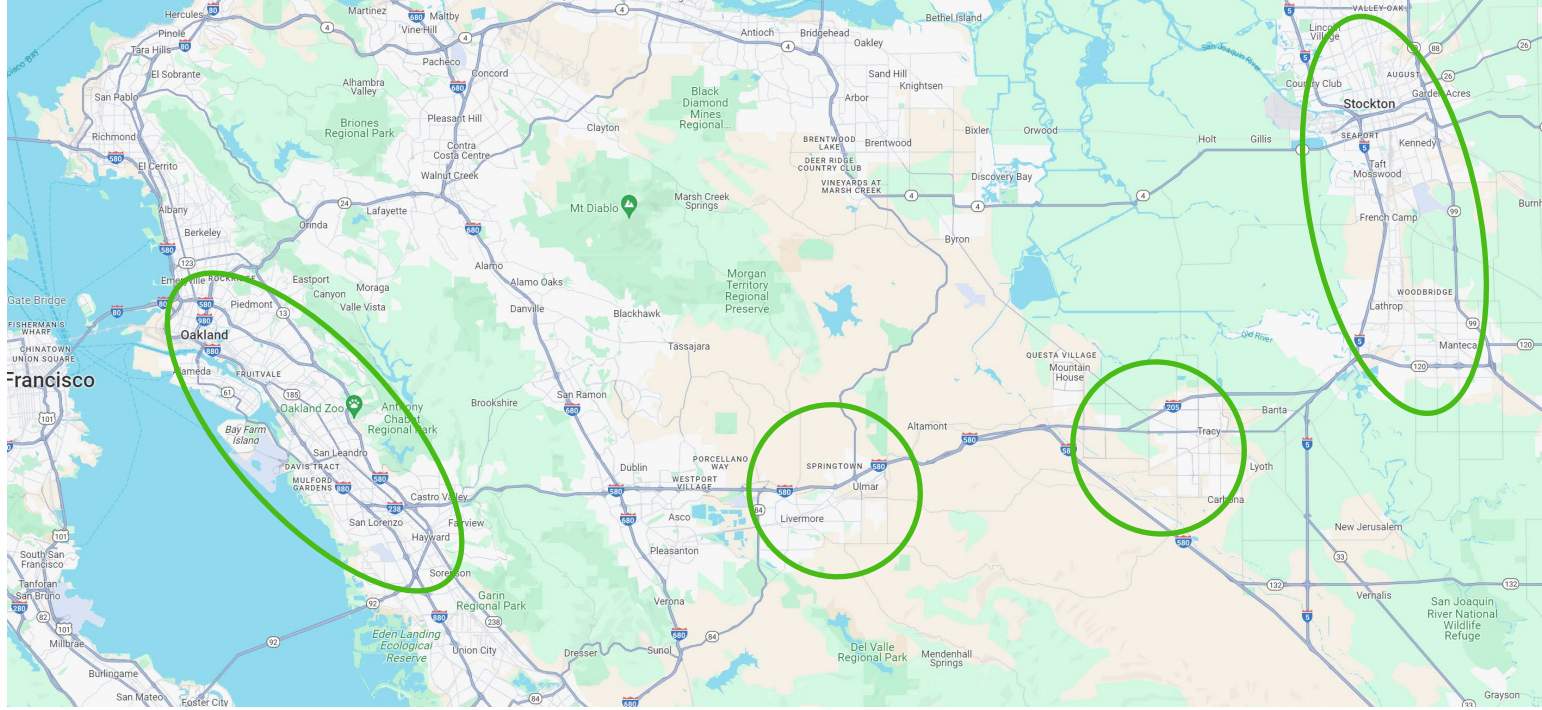
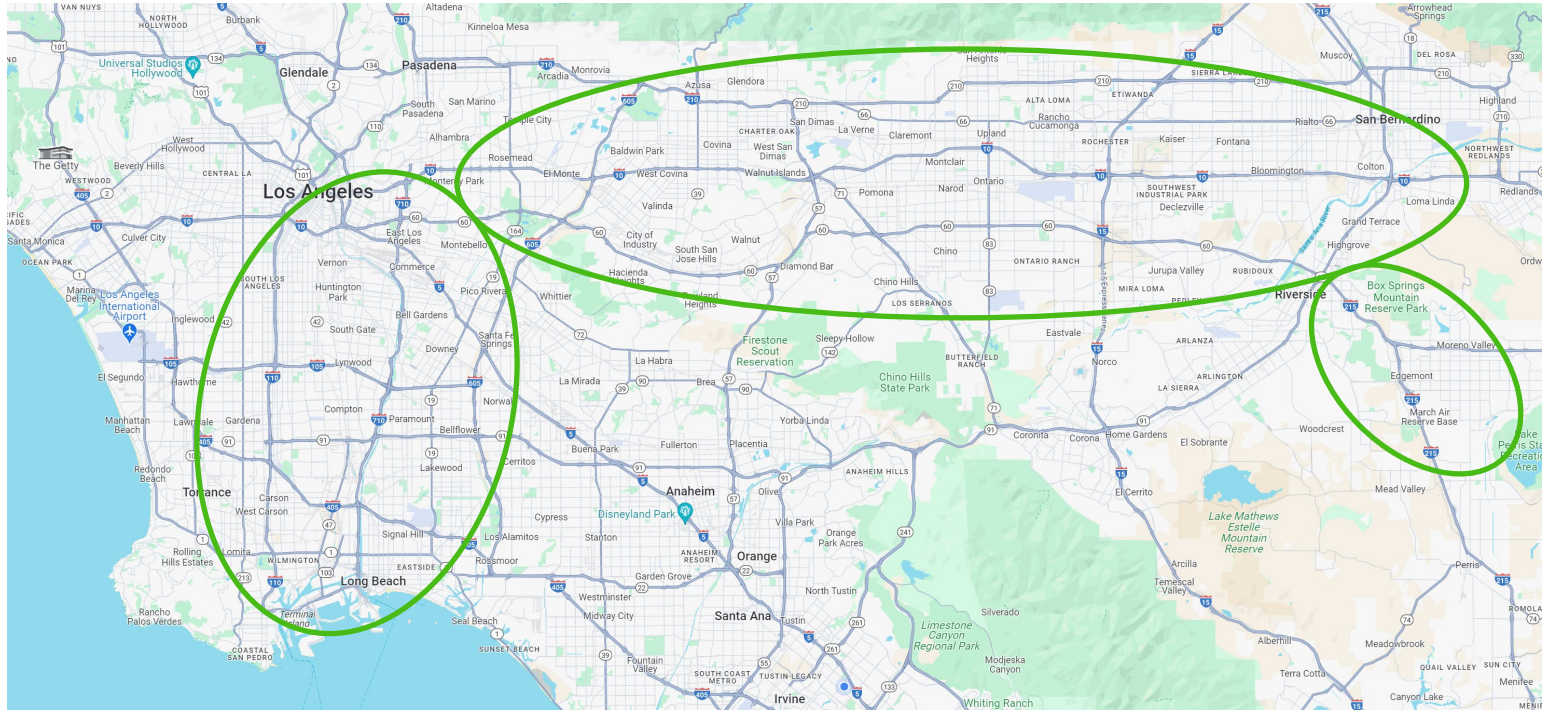
Conceptual Rendering of Forum Mobility's Harbor Depot at the Port of Long Beach. Opening late 2024.

FORUM MOBILITY

EV Truck Charging Depots

Forum Mobility's Port-Based Networks





Types of Charging Stations

Behind the Fence vs. Depot Approach

Behind the Fence

Within Warehouse Truck Courts

Depots

Yards Dedicated to Charging

1 Charging as a Service

- ✓ Dedicated charging space
- ✓ Long-term contract
- ✓ Open 24/7/365 w/ staff & security

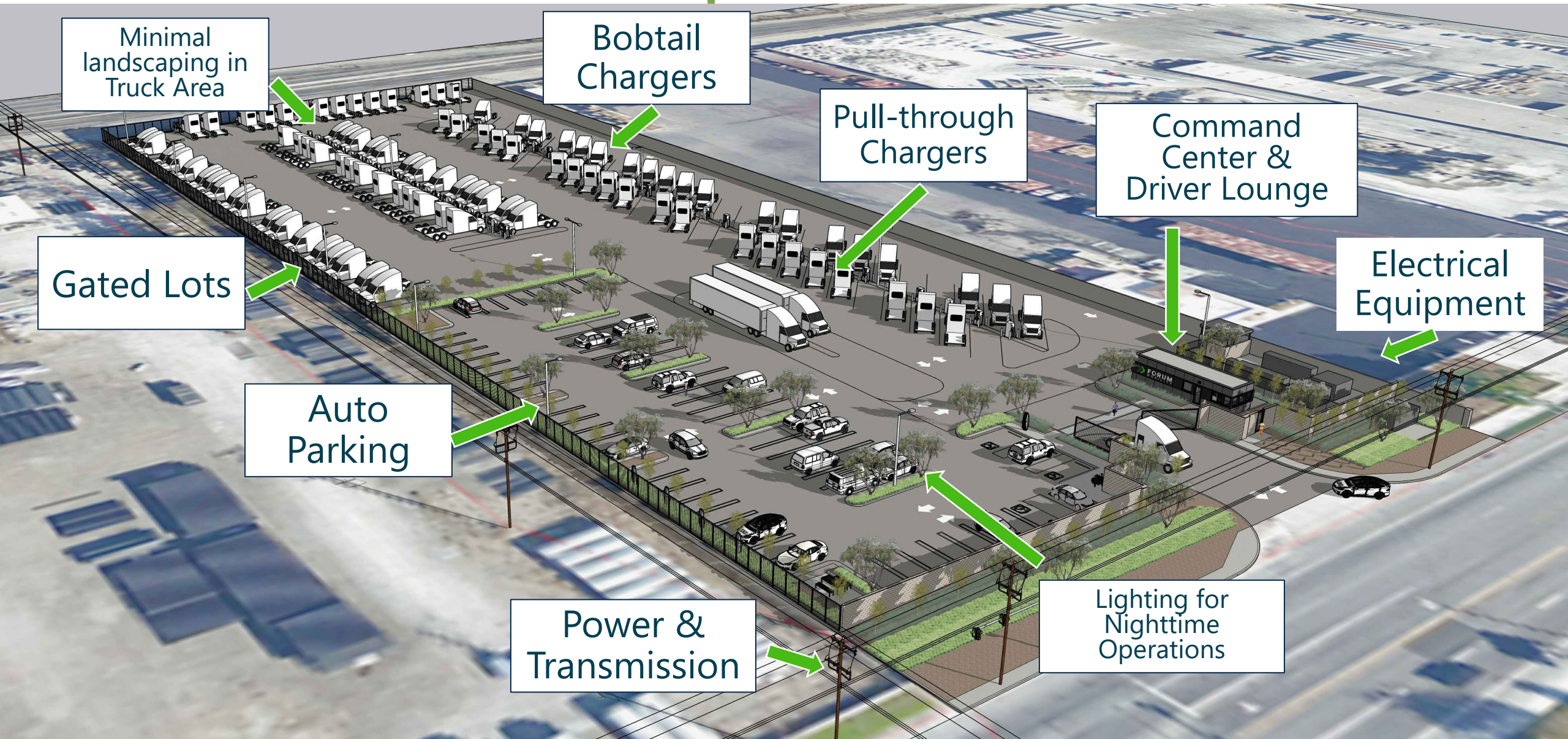
2 Truck Lease

- ✓ Fixed truck payment
- ✓ Paired with Forum Depots
- ✓ Focus on equity

Forum Mobility's two offerings

Forum provides two turn-key services

Common Depot Characteristics



A Developer's Perspective to Siting Depots

- Availability of Power
- Proximity to Freeways & Truck Routes
- Existing Industrial Users
- Straightforward Permitting Pathway

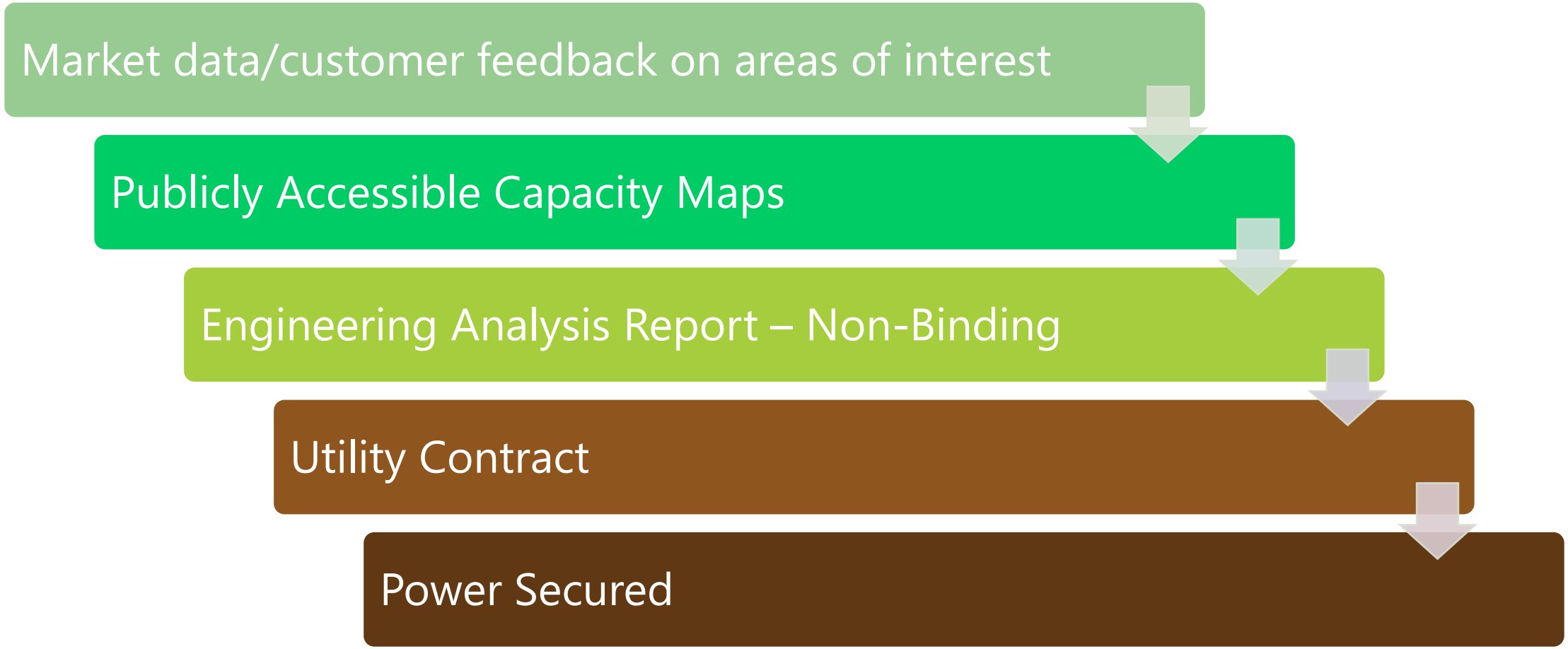
Powering EV Depots

Typical Depot = 5-10 MW

=

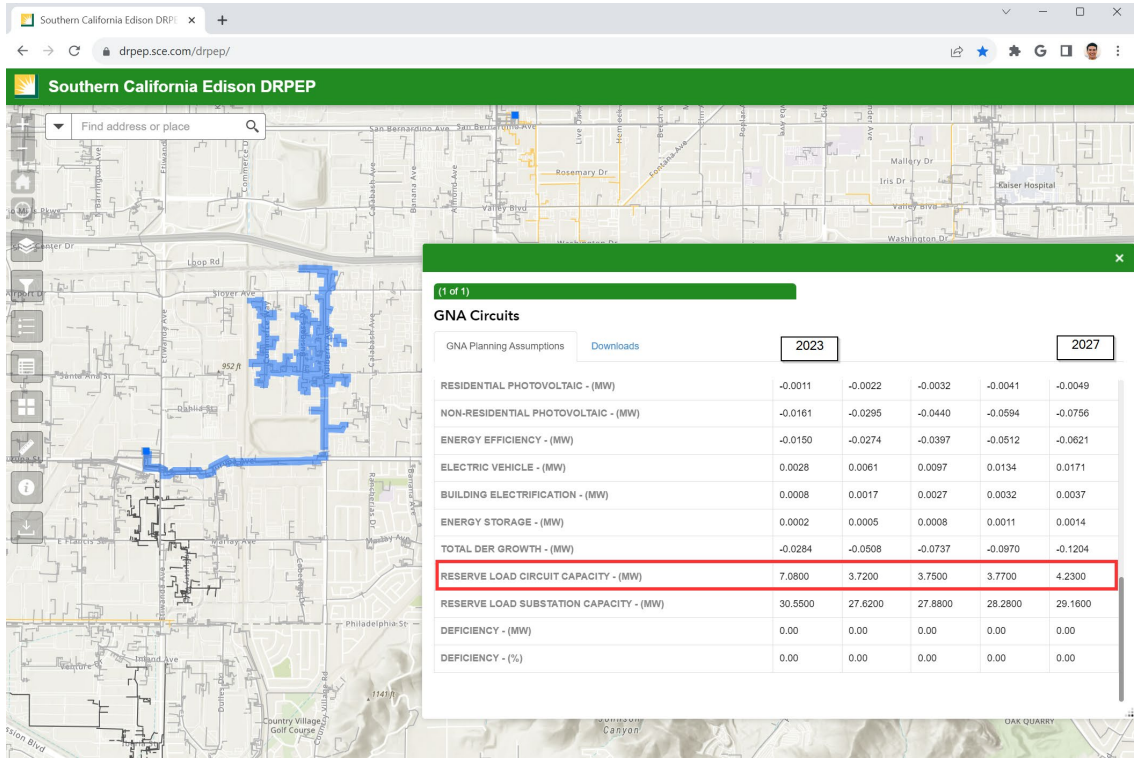
Avg. NFL Stadium = 5-10 MW

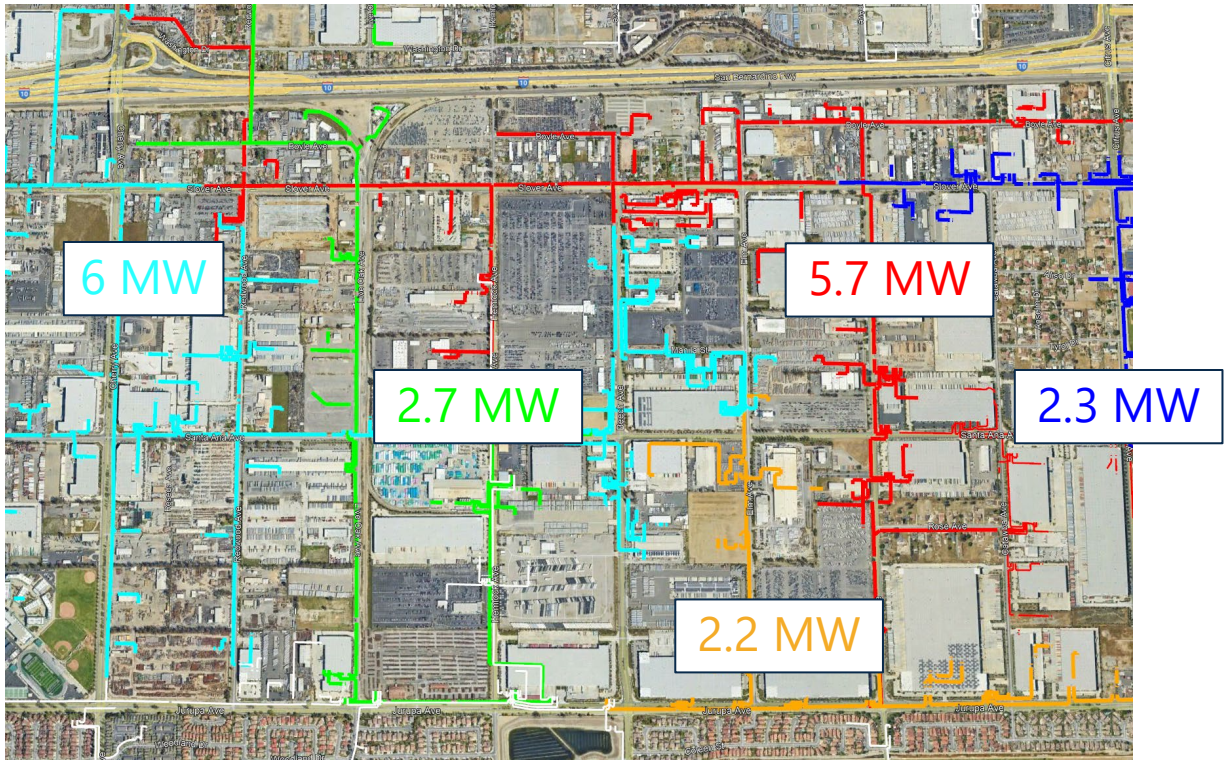
Siting Workflow (Power Focus)



Publicly Accessible Capacity Maps

Example: SCE Distribution Resources Plan External Portal (DRPEP)





Permitting

State Law Requires:

Cities/counties develop **streamlined** permitting process

Review limited to **health/safety**

No CUP required if charging station primary use

Time limits for review

Forum Mobility would not exist without:

Utility Make Ready Programs
(SCE, PG&E, LADWP)

energIIZE COMMERCIAL VEHICLES

Direct Grant Funding for Charger Station Development

CALIFORNIA AIR RESOURCES BOARD

Low Carbon Fuel Standard Program

CALIFORNIA HVIP

Hybrid & Zero-Emission Truck & Bus Voucher Incentive Project

Contact

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Sr. Development Associate

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www.forummobility.com

949.300.5825

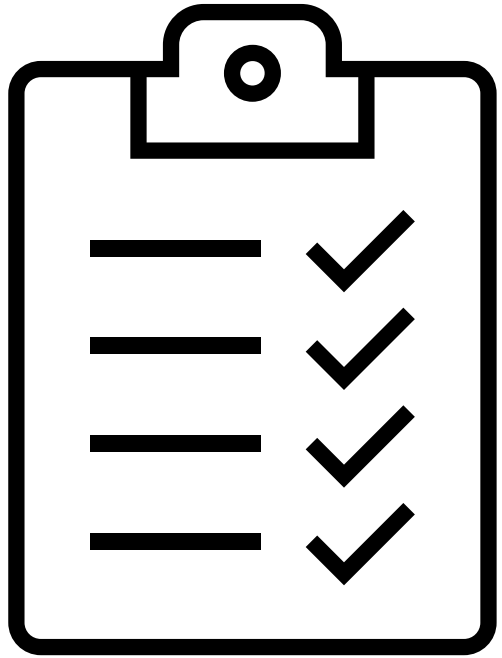
FORUM MOBILITY

Add me on LinkedIn!

TAC ENGAGEMENT

Poll Question #1

Have you or your agency developed formal siting criteria or provided direct recommendations on siting criteria for EV charging facilities? *(select one option)*



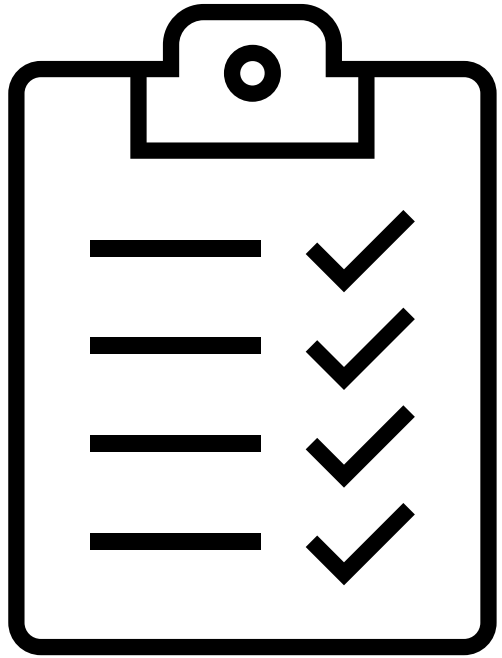
Further discussion of poll question

In your experience, what have been the most significant challenges in identifying suitable sites for charging and hydrogen fueling stations?

Are there successful strategies you've observed in navigating these challenges?

Poll Question #2

Among the siting criteria that we've discussed today, which do you believe is the most important? *(select one option)*



Further discussion of poll question

Are there specific stakeholders that you think we should consult with when it comes to assigning weights to siting criteria?

Beyond the siting criteria we've discussed, are there any additional criteria that you believe should be considered?

NEXT STEPS

What's Coming Next

- Continue to develop HEVI-LOAD charging requirements analysis; develop future year demand forecasts by December 2023
- Finalize Framework and workflow for Model Implementation by January 2024
- Develop Siting Criteria for EV charging Stations and Hydrogen Stations
- Begin work on developing the typologies for charging/fuel locations
- Review and incorporate findings from internal TAC survey on siting criteria

Contact

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THANK YOU!

For more information, please visit:

https://scag.ca.gov/socalzeti

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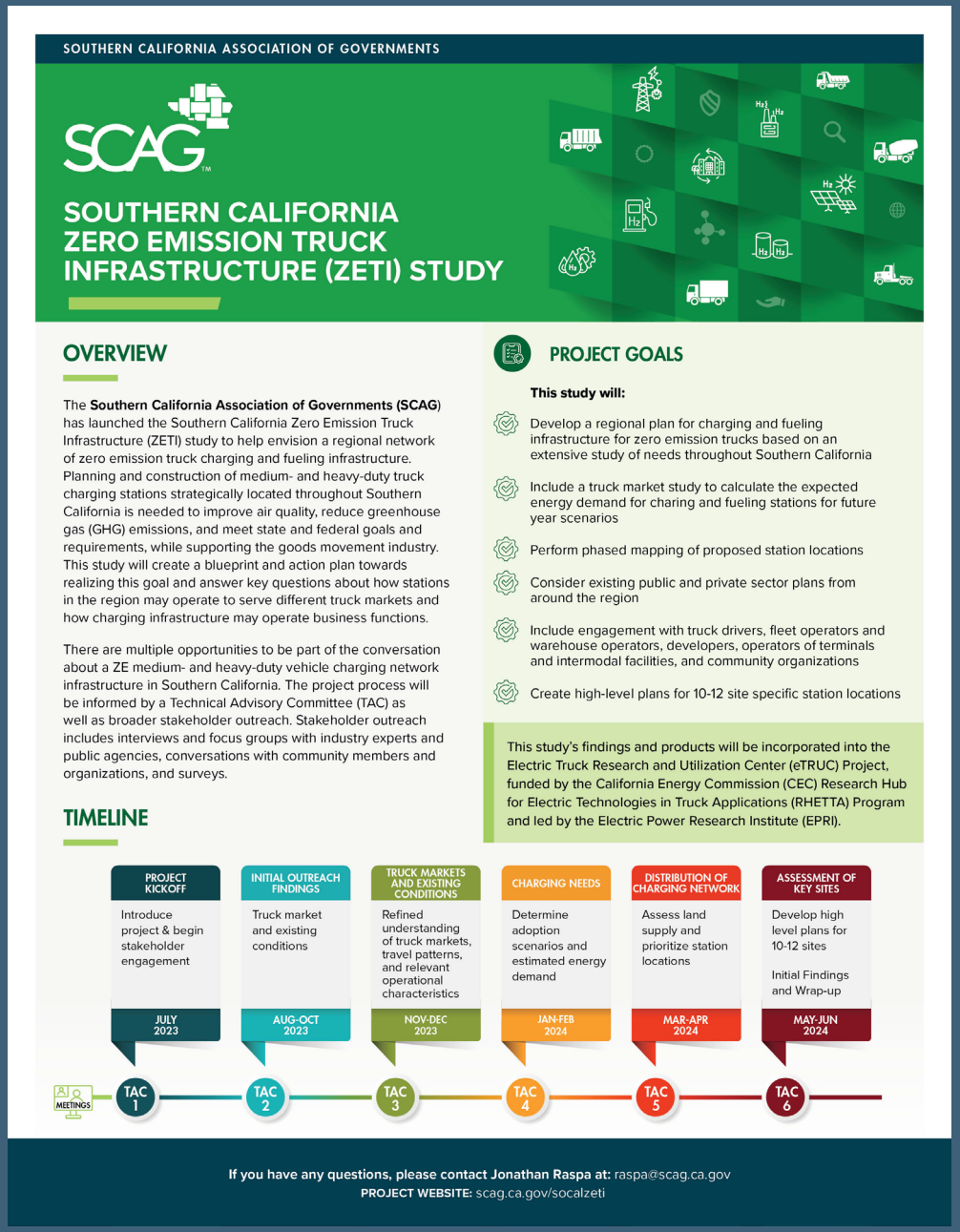

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

SOUTHERN CALIFORNIA ZERO EMISSION TRUCK INFRASTRUCTURE (ZETI) STUDY

OVERVIEW

The **Southern California Association of Governments (SCAG)** has launched the Southern California Zero Emission Truck Infrastructure (ZETI) study to help envision a regional network of zero emission truck charging and fueling infrastructure. Planning and construction of medium- and heavy-duty truck charging stations strategically located throughout Southern California is needed to improve air quality, reduce greenhouse gas (GHG) emissions, and meet state and federal goals and requirements, while supporting the goods movement industry. This study will create a blueprint and action plan towards realizing this goal and answer key questions about how stations in the region may operate to serve different truck markets and how charging infrastructure may operate business functions.

There are multiple opportunities to be part of the conversation about a ZE medium- and heavy-duty vehicle charging network infrastructure in Southern California. The project process will be informed by a Technical Advisory Committee (TAC) as well as broader stakeholder outreach. Stakeholder outreach includes interviews and focus groups with industry experts and public agencies, conversations with community members and organizations, and surveys.

PROJECT GOALS

This study will:

- Develop a regional plan for charging and fueling infrastructure for zero emission trucks based on an extensive study of needs throughout Southern California
- Include a truck market study to calculate the expected energy demand for charing and fueling stations for future year scenarios
- Perform phased mapping of proposed station locations
- Consider existing public and private sector plans from around the region
- Include engagement with truck drivers, fleet operators and warehouse operators, developers, operators of terminals and intermodal facilities, and community organizations
- Create high-level plans for 10-12 site specific station locations

This study's findings and products will be incorporated into the Electric Truck Research and Utilization Center (eTRUC) Project, funded by the California Energy Commission (CEC) Research Hub for Electric Technologies in Truck Applications (RHETTA) Program and led by the Electric Power Research Institute (EPRI).

TIMELINE

PROJECT KICKOFF	INITIAL OUTREACH FINDINGS	TRUCK MARKETS AND EXISTING CONDITIONS	CHARGING NEEDS	DISTRIBUTION OF CHARGING NETWORK	ASSESSMENT OF KEY SITES
Introduce project & begin stakeholder engagement	Truck market and existing conditions	Refined understanding of truck markets, travel patterns, and relevant operational characteristics	Determine adoption scenarios and estimated energy demand	Assess land supply and prioritize station locations	Develop high level plans for 10-12 sites Initial Findings and Wrap-up
JULY 2023	AUG-OCT 2023	NOV-DEC 2023	JAN-FEB 2024	MAR-APR 2024	MAY-JUN 2024
MEETINGS: TAC 1	TAC 2	TAC 3	TAC 4	TAC 5	TAC 6

If you have any questions, please contact Jonathan Raspa at: raspa@scag.ca.gov
PROJECT WEBSITE: scag.ca.gov/socalzeti