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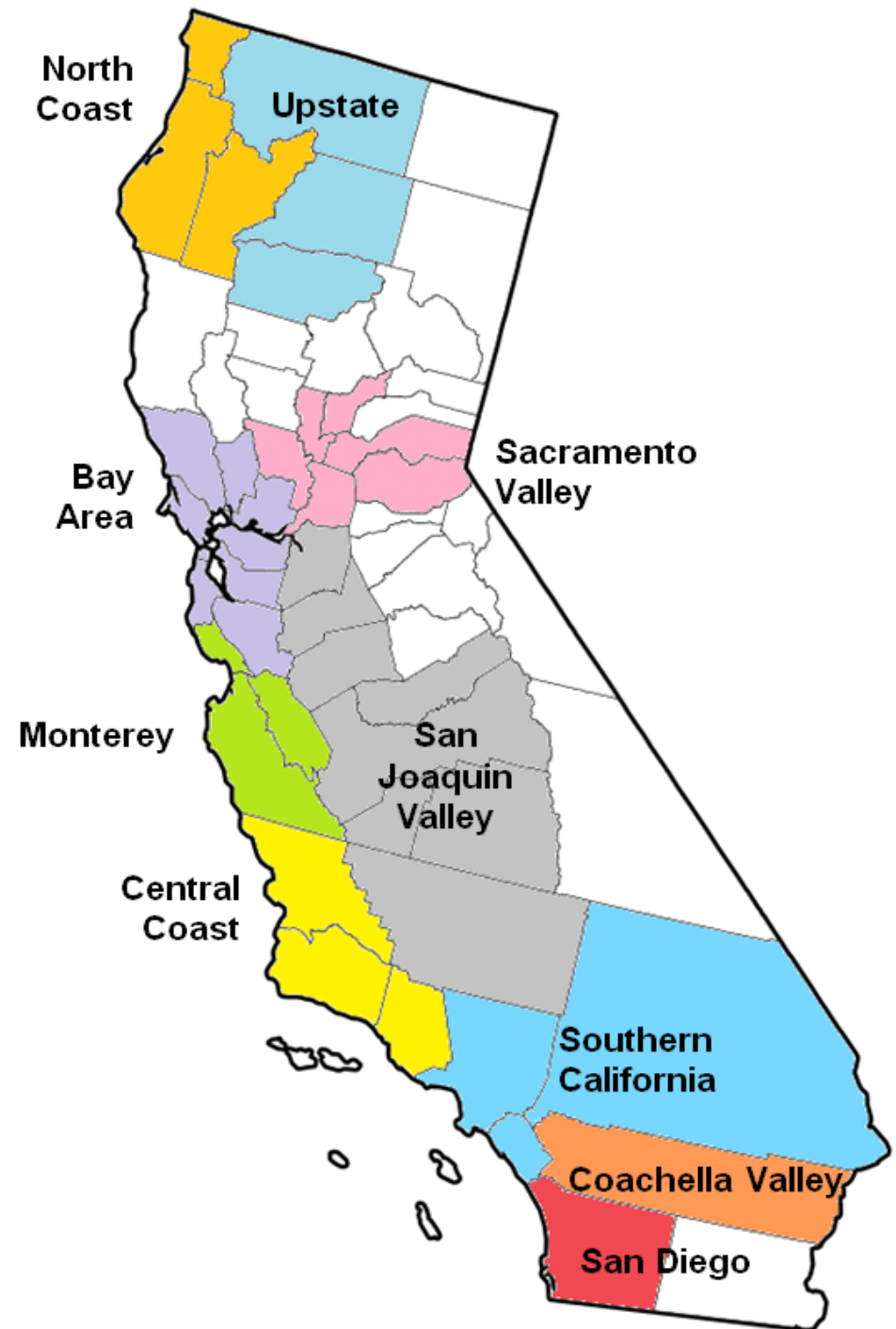|	
Docket Number:	16-ALT-01
Project Title:	Funding Strategies for Electric Vehicle Infrastructure Workshop
TN #:	211743
Document Title:	Presentation - Regional Plug-In Electric Vehicle Readiness Plans
Description:	Staff Workshop on Funding Strategies for Electric Vehicle Infrastructure
Filer:	Tami Haas
Organization:	California Energy Commission
Submitter Role:	Commission Staff
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Docketed Date:	6/7/2016

Regional Readiness and ZEV Implementation Solicitations

Solicitation	Solicitation Title	CEC $	# of Projects
PON-10-602	Regional Plans to Support PEV Readiness	$2.0 M	10 Regional PEV Readiness Plans
PON-13-603	Alternative Fuel Readiness Plans	$2.3 M	8 Alternative Fuel Readiness Plans
PON-14-603	Zero Emission Vehicle Readiness	$2.0 M	8 ZEV Implementation Projects
PON-14-607	Zero Emission Vehicle Readiness	$1.3 M	8 ZEV Implementation Projects
TOTAL		$7.6 M	34 Regional Readiness Plans

Regional PEV Readiness Plans PON-10-602

- 10 awards covering 40 counties and all major metropolitan areas

- Included strategies for:
  - Streamlining of EVSE permitting, installation, and inspection processes.
  - Best practices for "PEV-ready" buildings and public works guidelines.
  - Addressing multi-unit dwellings, workplace, corridor, and fleet charging.
  - Training, education, and outreach
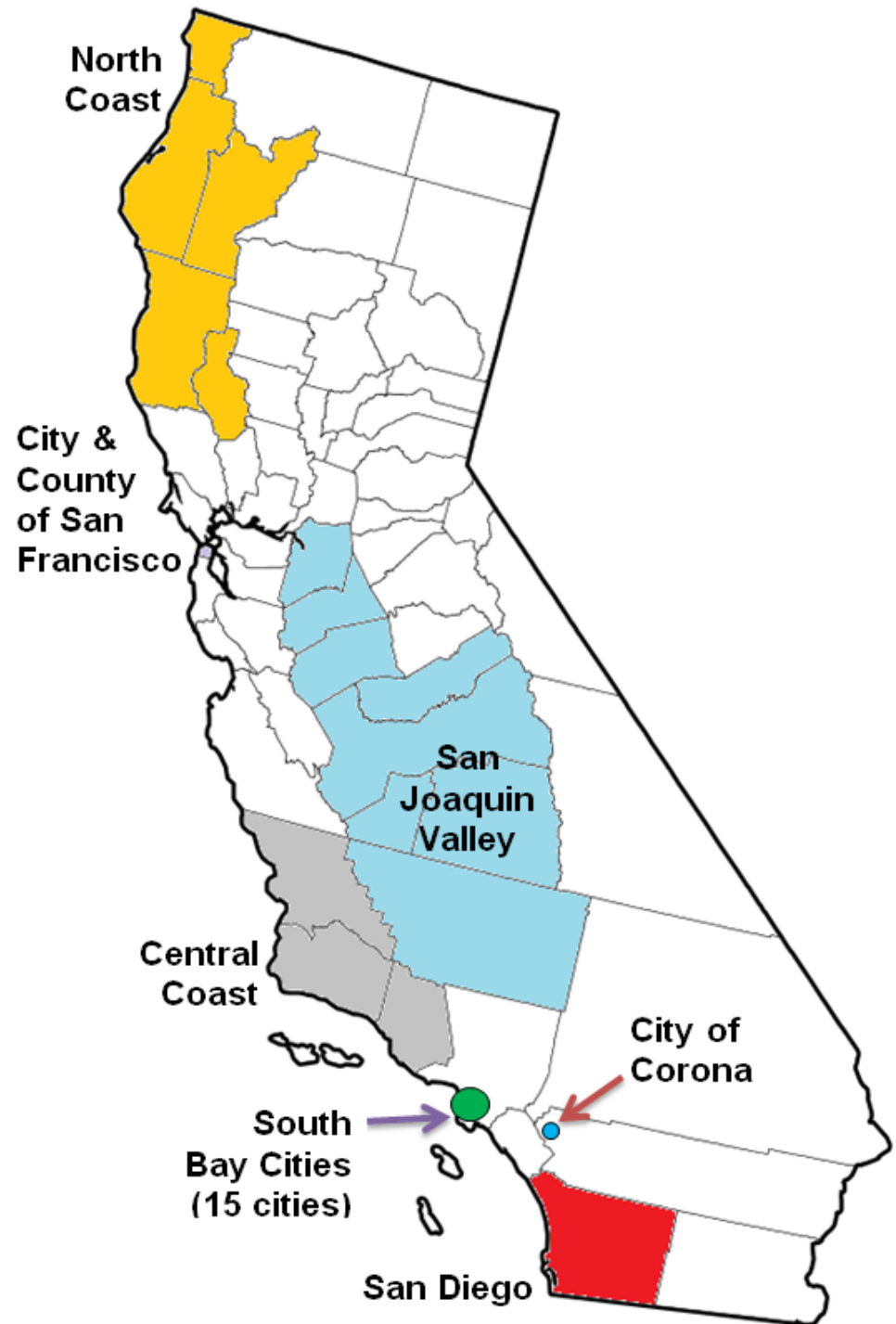 - Infrastructure plans

Alternative Fuel Readiness Plans PON-13-603

- 8 awards covering 14 counties, 1 city, and a hydrogen plan in early FCEV markets statewide.

- Multiple fuel types – electricity, natural gas, hydrogen, biofuels
  - Strategic assessment of the challenges and opportunities for the adoption of alternative fuels and implementation of targeted outreach programs.

North Coast

City & County of San Francisco

San Mateo County

Monterey Bay

Central Coast

San Diego

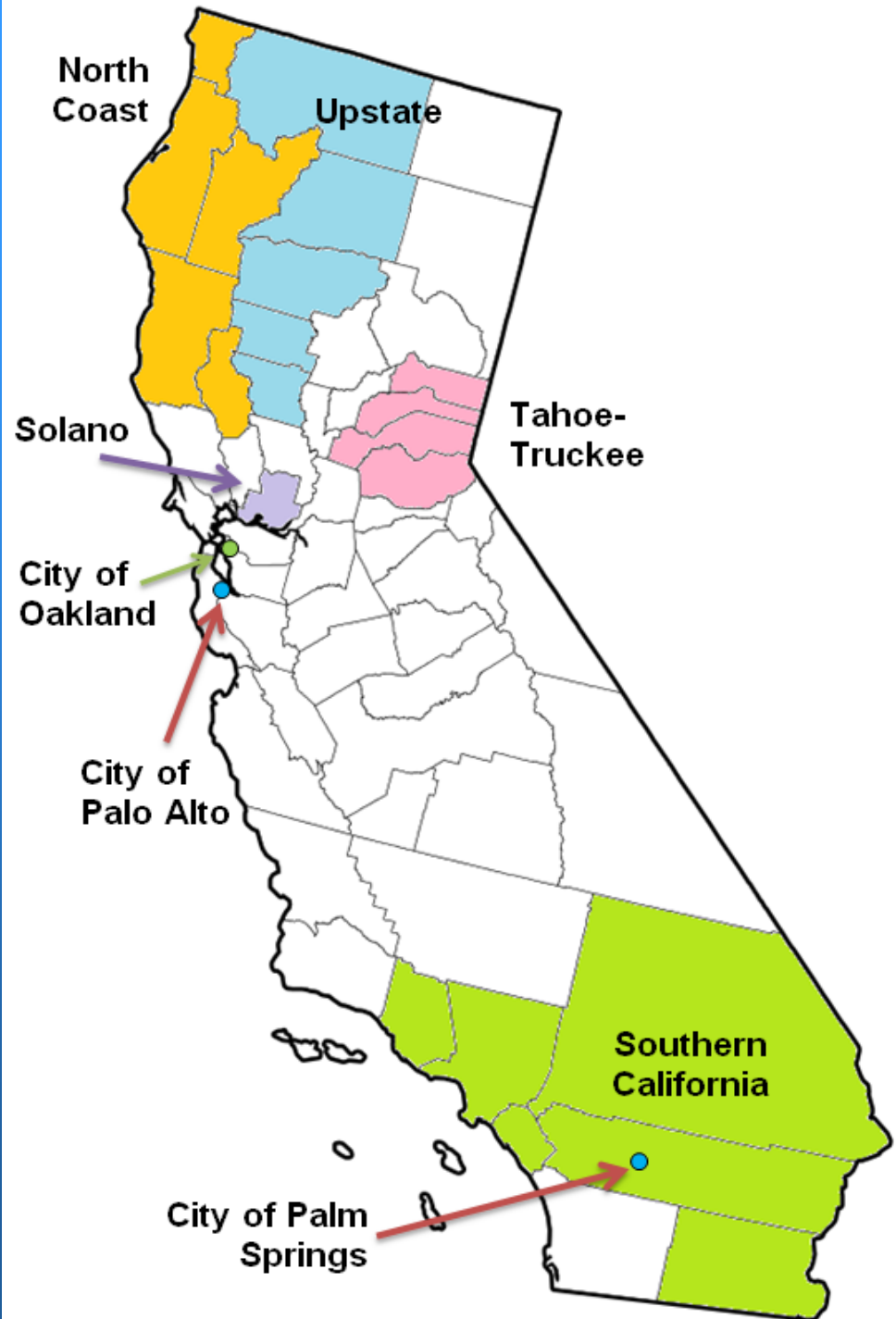City of Davis

Hydrogen Plan in early FCEV markets

Zero Emission Vehicle Readiness PON-14-603

- 8 awards covering 18 counties and 16 cities

- Three categories of funding for PEV and FCEV Readiness
  1. Implementation activities identified in previous regional PEV planning awards
  2. Development of regional PEV readiness plans in areas where no such plans had yet been developed
  3. FCEV readiness activities

North Coast

City & County of San Francisco

San Joaquin Valley

Central Coast

City of Corona

South Bay Cities (15 cities)

San Diego

Zero Emission Vehicle Readiness PON-14-607

- 8 awards covering 21 counties and California and 3 cities

- Three categories of funding for PEV and FCEV Readiness
  1. Implementation activities identified in previous regional PEV planning awards
  2. Development of regional PEV readiness plans in areas where no such plans had yet been developed
  3. FCEV readiness activities

North Coast
Upstate
Tahoe-Truckee
Solano
City of Oakland
City of Palo Alto
Southern California
City of Palm Springs

PEV Infrastructure Planning

- PON-10-602 Regional PEV Readiness Planning

  "Develop regional charge port infrastructure location identification, quantity and investment required to implement the installation of the infrastructure beginning in 2014. Locations include public access on public property, commercial property, highway corridors, and workplaces."

- PON-13-603 Alternative Fuel Readiness Plans

  "Identify challenges and sharing best practices for planning, permitting, deployment, maintenance, and inspection of alternative fuel infrastructure."
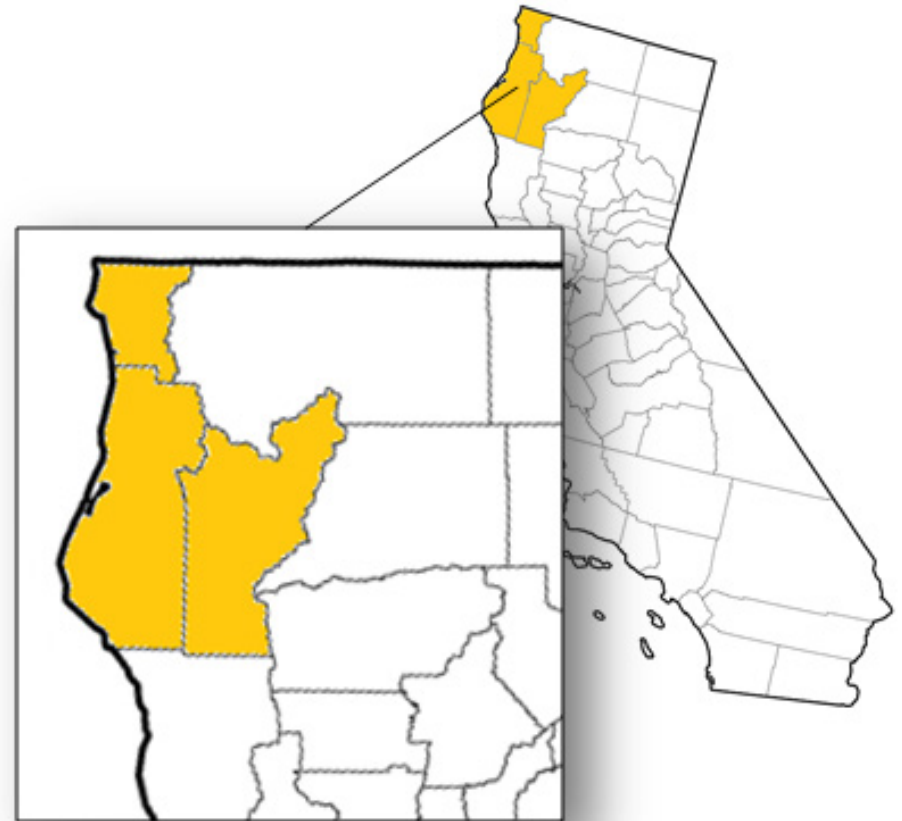
- PON-14-603 & PON-14-607 ZEV Readiness

  "For PEV Readiness Plan development, develop regional charge port infrastructure location identification, quantity and investment required to implement the installation of the infrastructure beginning in 2016. Locations may include public access on public property, commercial property, highway corridors, and workplaces."

North Coast PEV Readiness Plan

Develop a readiness plan to support the successful introduction of PEV and strategic development of EV charging infrastructure in the region.
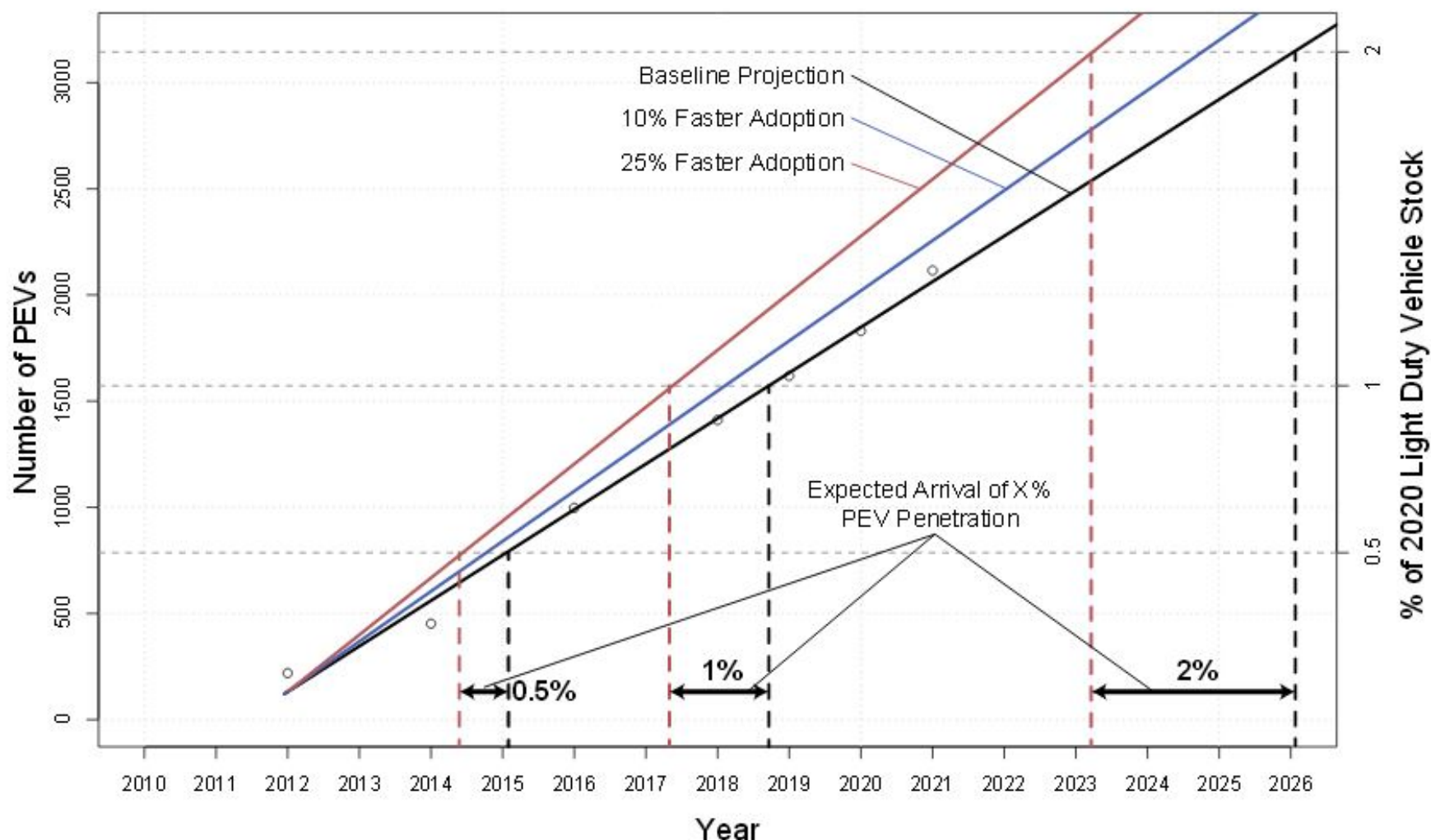

Region:
Del Norte, Humboldt, and Trinity Counties

Projection of PEV Adoption in Humbodlt County

(assumes linear growth in total registered vehicles and that PEV adoption follows same trend as hybrid-electric adoption)

Using vehicle registration data for Humboldt County, PEV adoption was projected as far out as 2026. The time periods over which the region expects to achieve benchmark penetration levels are depicted near the horizontal axis.

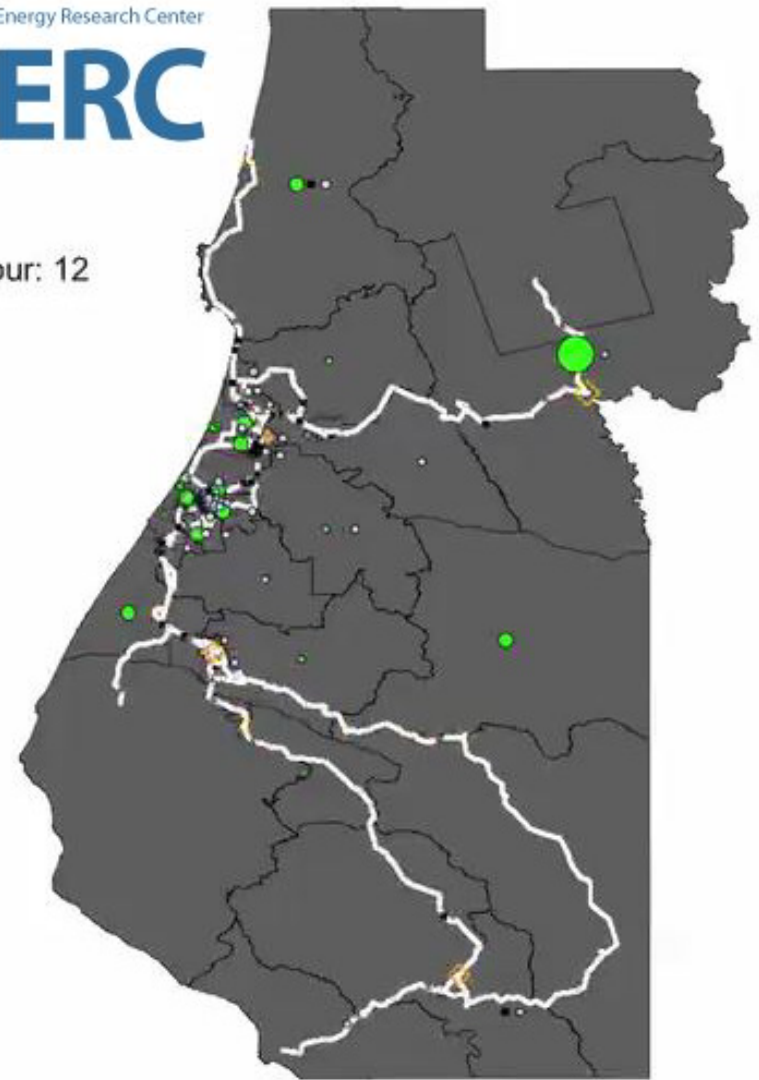# North Coast Charging Infrastructure Plan

- PEV Infrastructure (PEVI) Model
  - Agent-based modeling simulation

- Individual PEV drivers are simulated as they conduct their travel and interact with virtual charging stations.

- Shows an animation of a single day of simulated travel and charging by 6,000 PEV owners in Humboldt County.

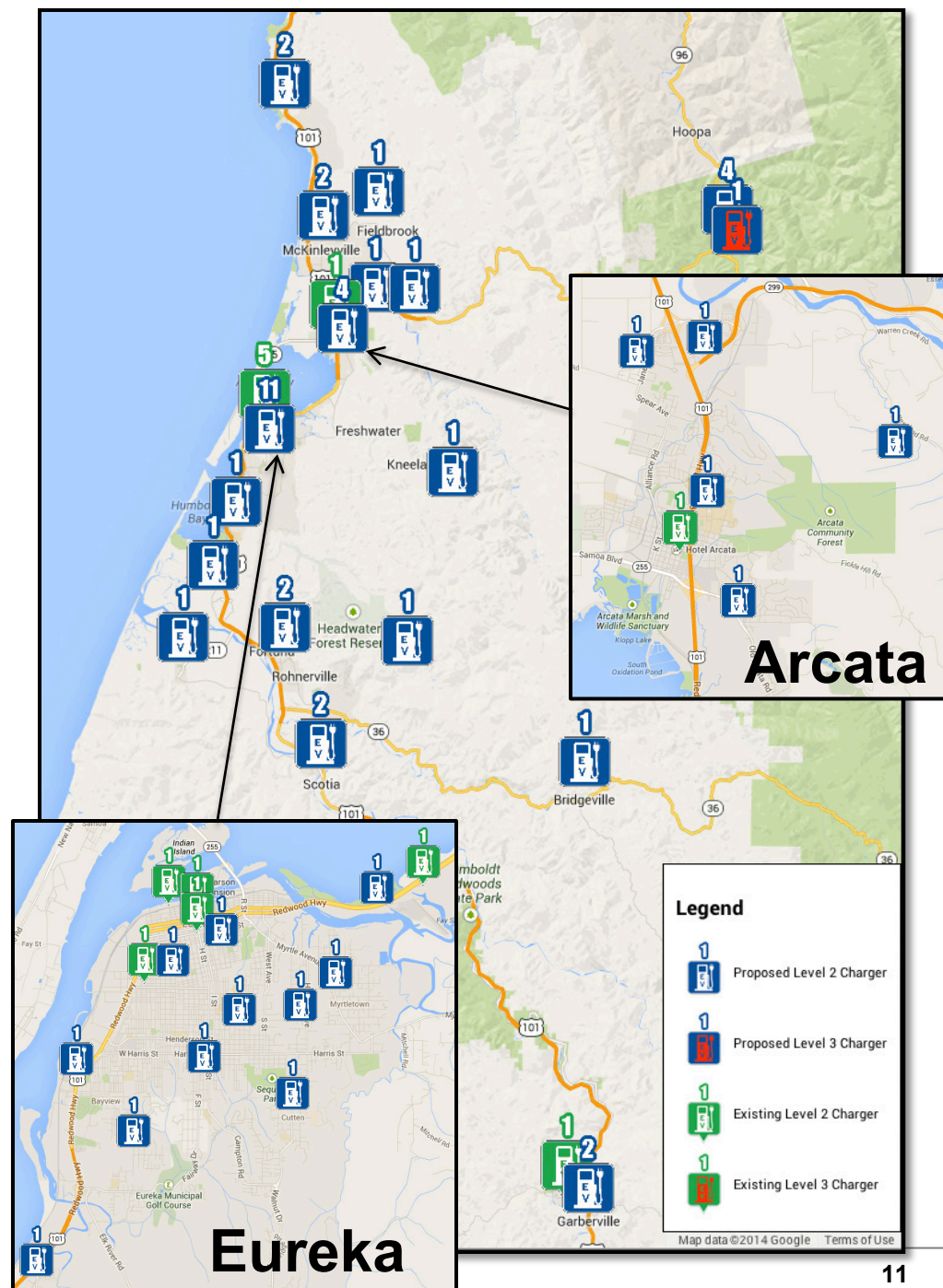- North Coast region was divided into 52 zones.

Hour: 12

- Yellow circles indicate public charging.
- Green circles indicate charging events at drivers homes.
- Size of the circles indicate the number of drivers charging at any point in time.
- See the PEVI in action: http://www.schatzlab.org/projects/policyanalysis/pev/

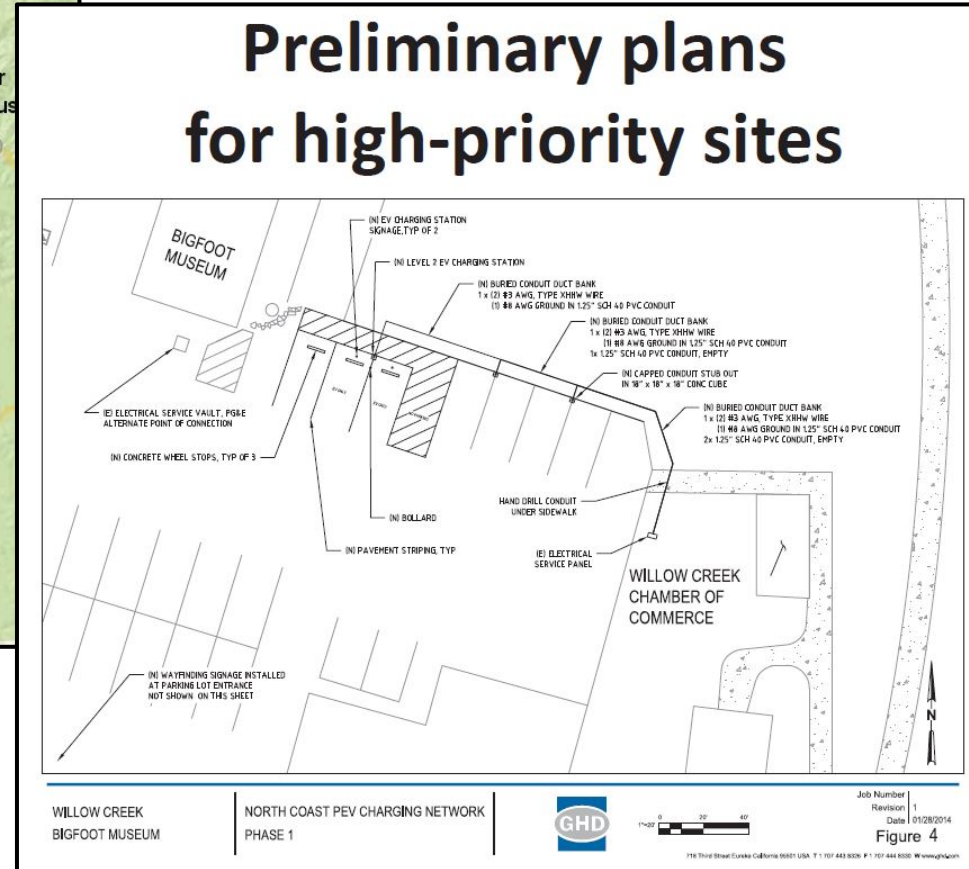# North Coast Charging Infrastructure Plan

- Looked at PEV penetration rates between 0.5% and 2%.

- Model mapped out regional locations where a charger is needed

- Sited chargers to minimize delay of simulated drivers.

- Macro level analysis:
  - ~60 public chargers are sufficient to support ~3,000 drivers (2% penetration)

- Micro-siting Analysis
  - Site assessments at the parking space level
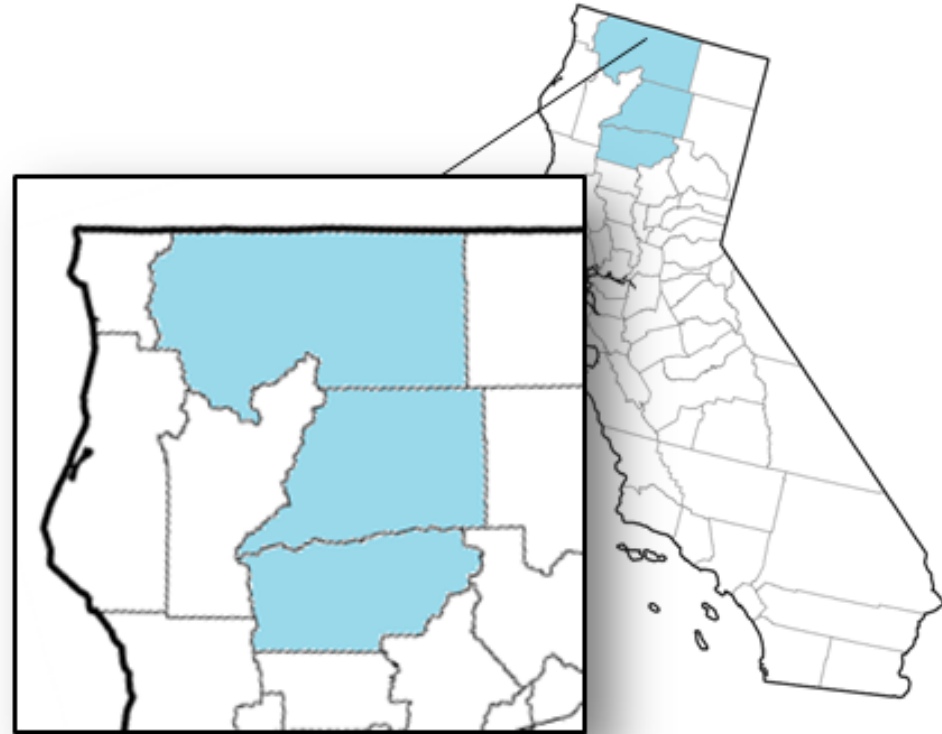
North Coast Proposed Phase 1 Sites

Blue = Existing Sites
Red = Propose Sites

Upstate PEV Readiness Plan

Develop a readiness plan to support the successful introduction of PEV and strategic development of EV charging infrastructure in the region.
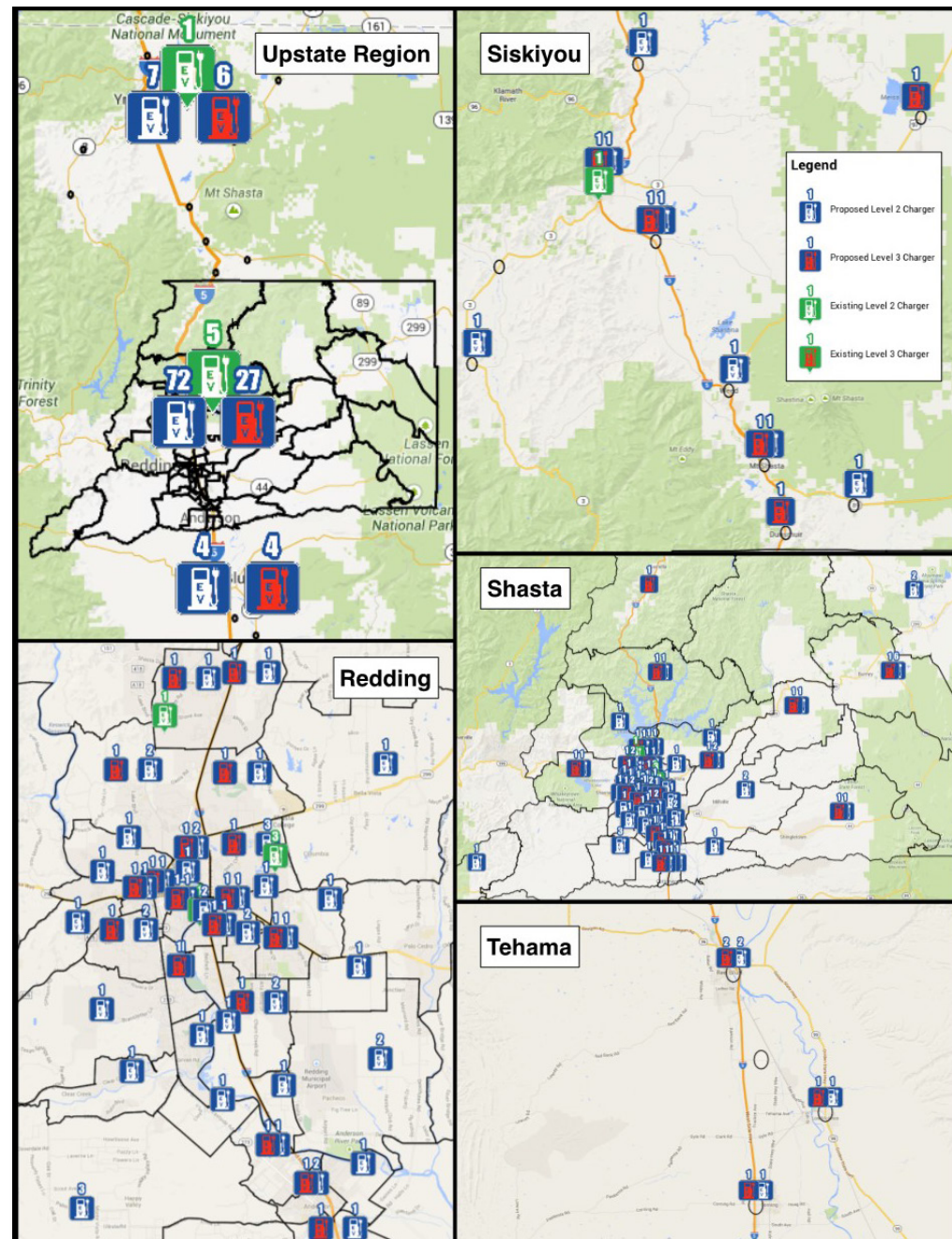

Region:
Shasta, Siskiyou, and Tehama Counties

Upstate Charging Infrastructure Plan

- Look at PEV penetration rates between 0.5% and 2%.

- Model mapped out regional locations where a charger is needed

- Macro-level analysis:
  - ~120 chargers were sufficient to support ~5,000 drivers (2% penetration)

- Developed a micro-siting rubric tool used to rank EVCS sites.
  - Received input from local PEV Coordinating Council to rank the sites based on criteria important to the community.

Source: SERC, adapted from Google Maps, 2014

Upstate Proposed Phase 1 Charging Stations

	County	City	Description
1	Siskiyou	Yreka	Junction Shopping Center
2		Mt. Shasta	Public Parking Lot on W. Lake St.
3		Mt. Shasta	Tri Counties Bank
4	Shasta	Redding	McConnell Arboretum
5		Redding	Sundial Bridge Parking Lot
6		Redding	City Hall
7	Tehama	Red Bluff	Tehama County Visitor Center
8		Red Bluff	River Park
9		Red Bluff	Public Parking on Pine Street Downtown

Upstate EVSE Infrastructure Costs

Approximate Cost of Recommended EVSE Infrastructure by Charger Type and County for Three PEV Penetration Scenarios

	Level 2	DC Fast	Total Cost*
0.5% Fleet Penetration			
Shasta	$849,000	$285,000	$1,134,000
Siskiyou	$123,000	$45,000	$168,000
Tehama	$87,000	$105,000	$192,000
	$1,059,000	**$435,000**	**$1,494,000**
1% Fleet Penetration			
Shasta	$876,000	$600,000	$1,476,000
Siskiyou	$135,000	$120,000	$255,000
Tehama	$93,000	$195,000	$288,000
	$1,104,000	**$915,000**	**$2,019,000**
2% Fleet Penetration			
Shasta	$1,161,000	$2,085,000	$3,246,000
Siskiyou	$111,000	$435,000	$546,000
Tehama	$69,000	$375,000	$444,000
	$1,341,000	**$2,895,000**	**$4,236,000**

*For each penetration, total regional costs are listed in bold. These costs are cumulative. For example, the infrastructure in the 0.5% scenario is also contained in the costs for the 1% and 2% scenarios.
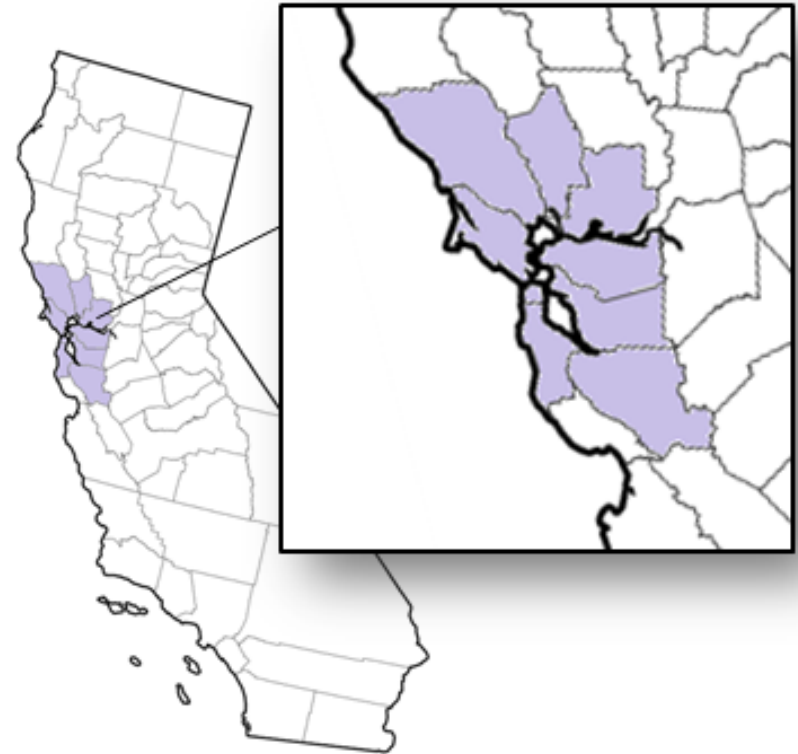
Source: SERC, 2014

Bay Area PEV Readiness Plan

Develop a readiness plan to support the successful introduction of PEV and strategic development of EV charging infrastructure in the region.
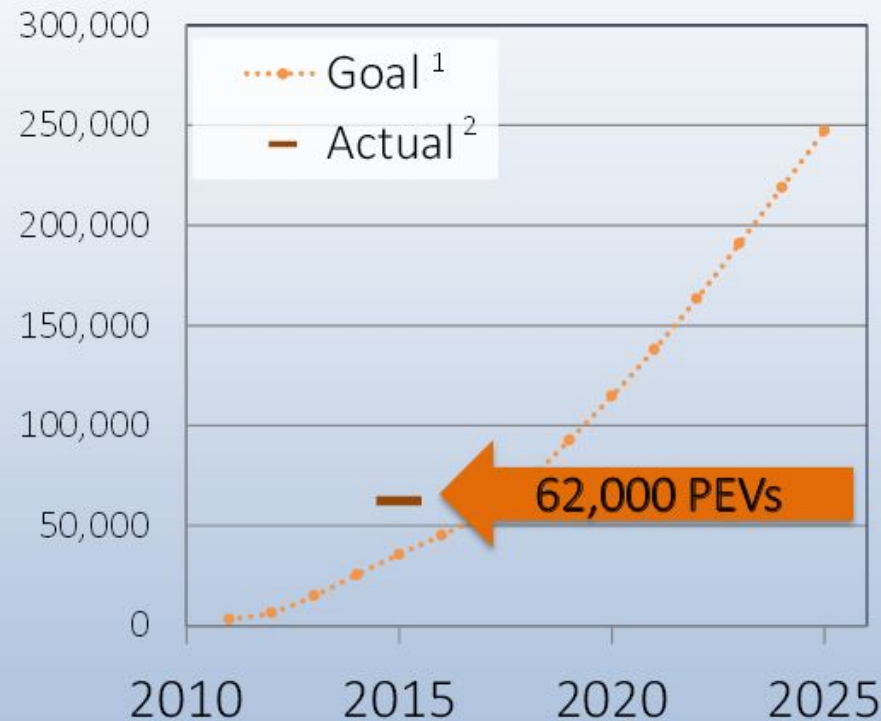

Region:
Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties

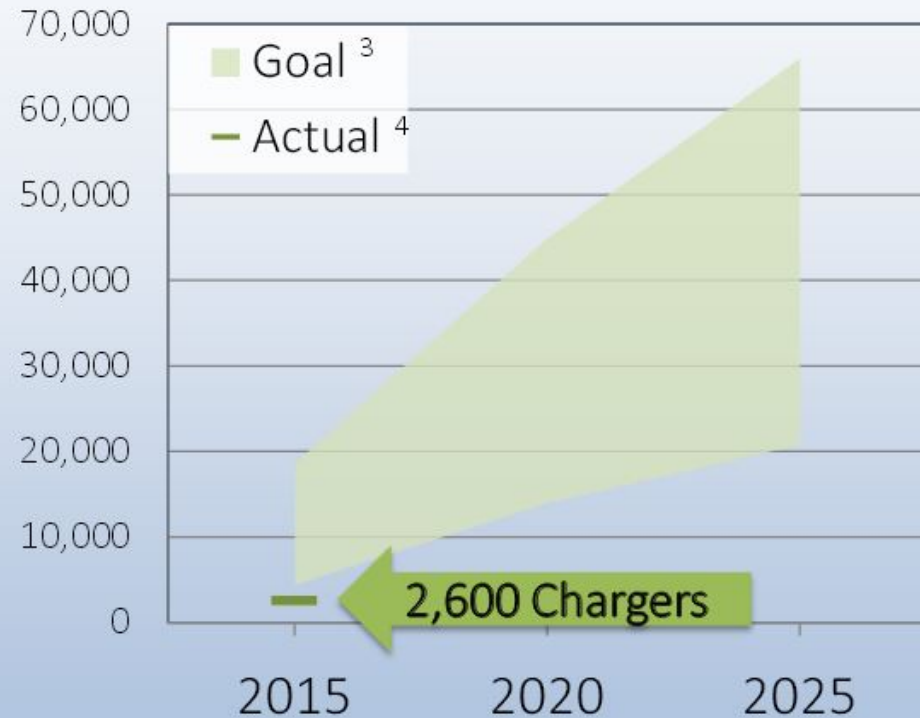# Bay Area Goals & Current Estimates

PEV

- Goal [1]
- Actual [2]

62,000 PEVs

Chargers

- Goal [3]
- Actual [4]

2,600 Chargers

[1] Based on estimated PHEV and BEV Targets from the PEV Readiness Plan
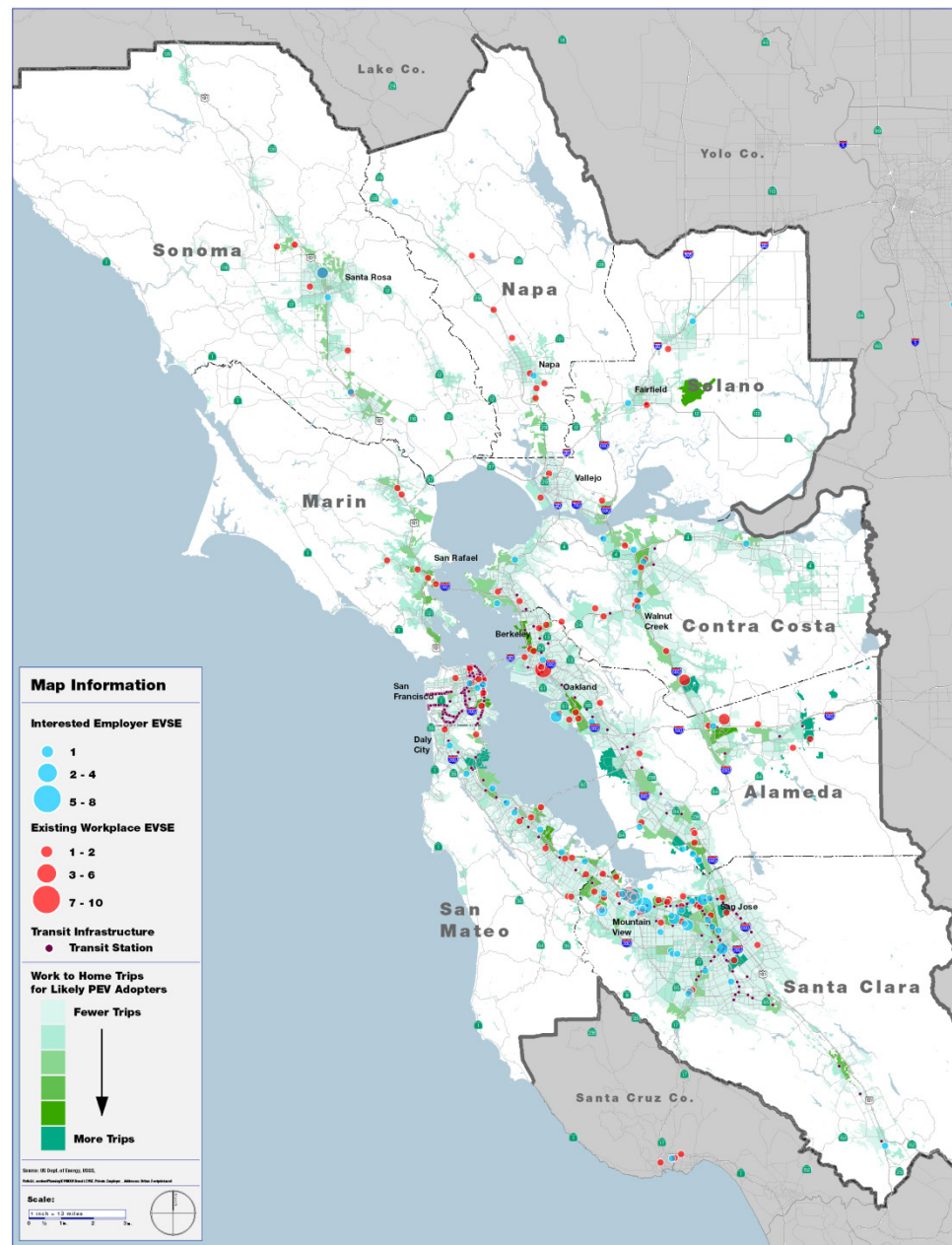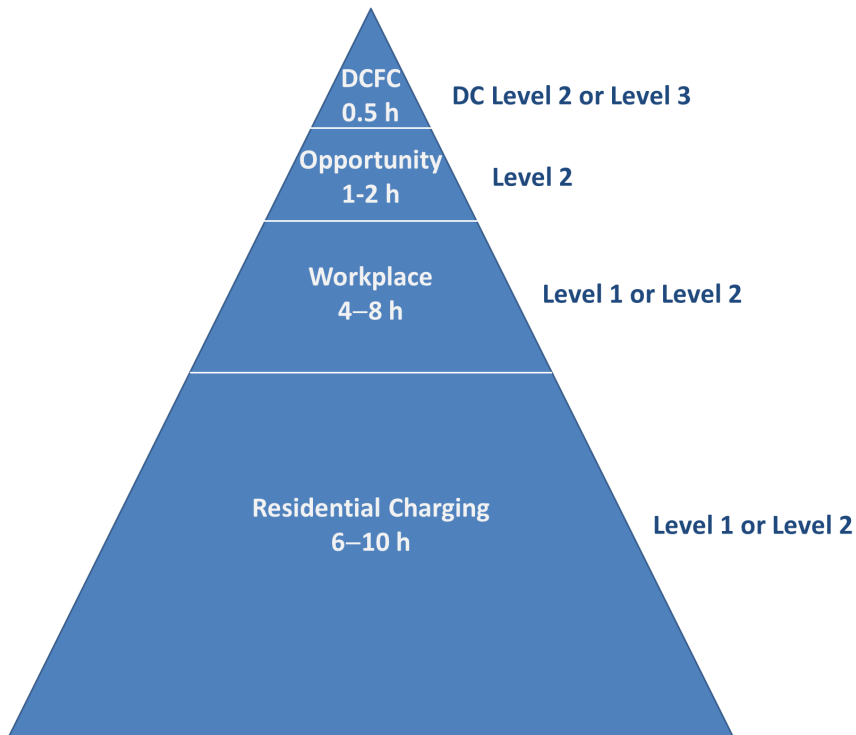[2] Data for 2015 are only available through October 25, 2015
[3] Based on estimated demand for publicly available Level 1 and Level 2 chargers using ICF and EPRI Method Estimates from the PEV Readiness Plan
[4] Based on US Department of Energy – Energy Efficiency and Renewable Energy, Alternative Fuels Data Center. September 24, 2015.

Siting for Workplace Charging (Level 1 and Level 2)

Pyramid diagram (top to bottom):
- DCFC 0.5 h — DC Level 2 or Level 3
- Opportunity 1-2 h — Level 2
- Workplace 4–8 h — Level 1 or Level 2
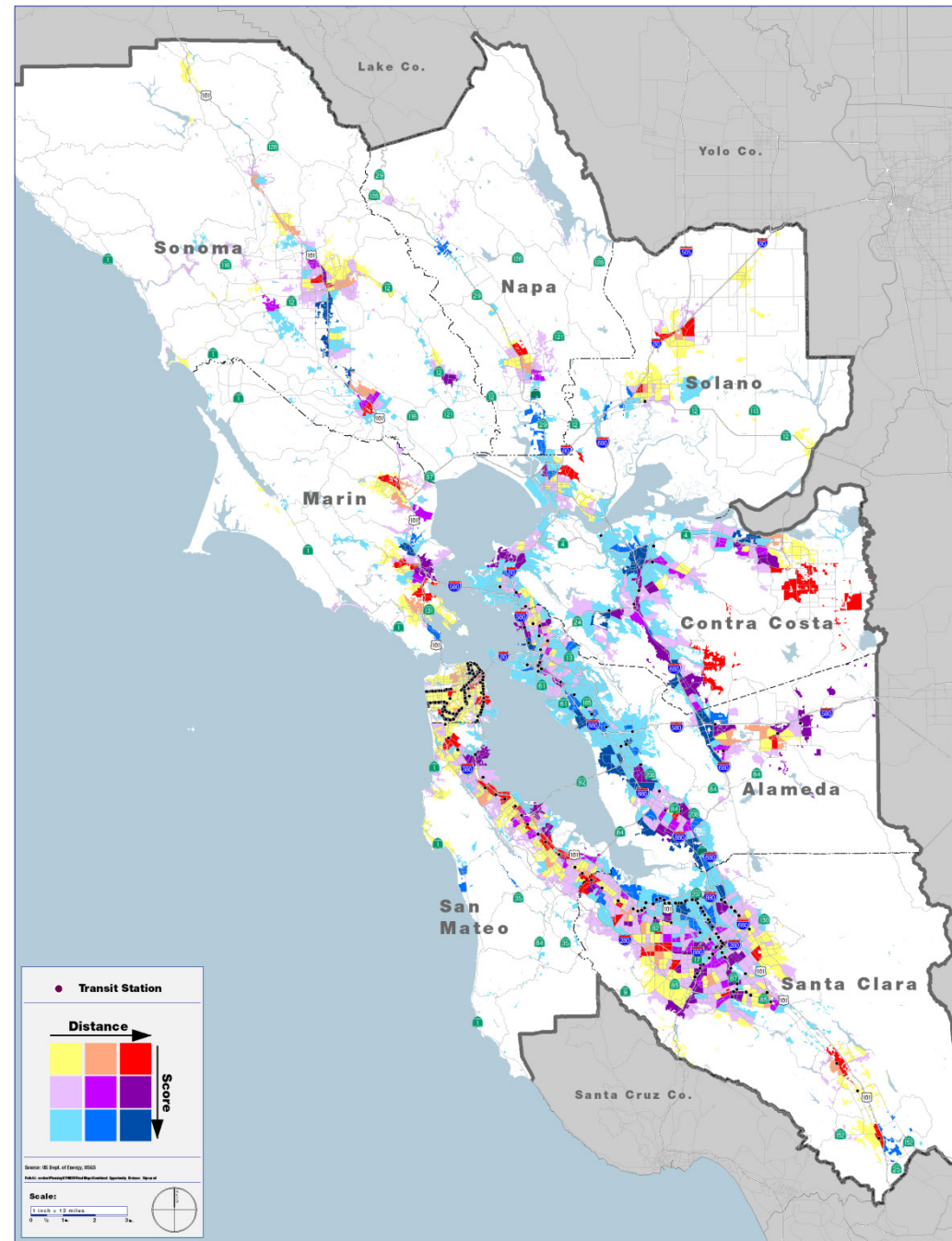- Residential Charging 6–10 h — Level 1 or Level 2

Source: BAAQMD, ICF, Fehr & Peers, MTC GIS Unit

Siting for Opportunity Charging (Level 1 and Level 2)

PEVs are parked for varying times at these locations.

Typical Locations:
- Shopping Centers
- Airport (Short/Long Term Parking)
- Cultural and Sports Centers
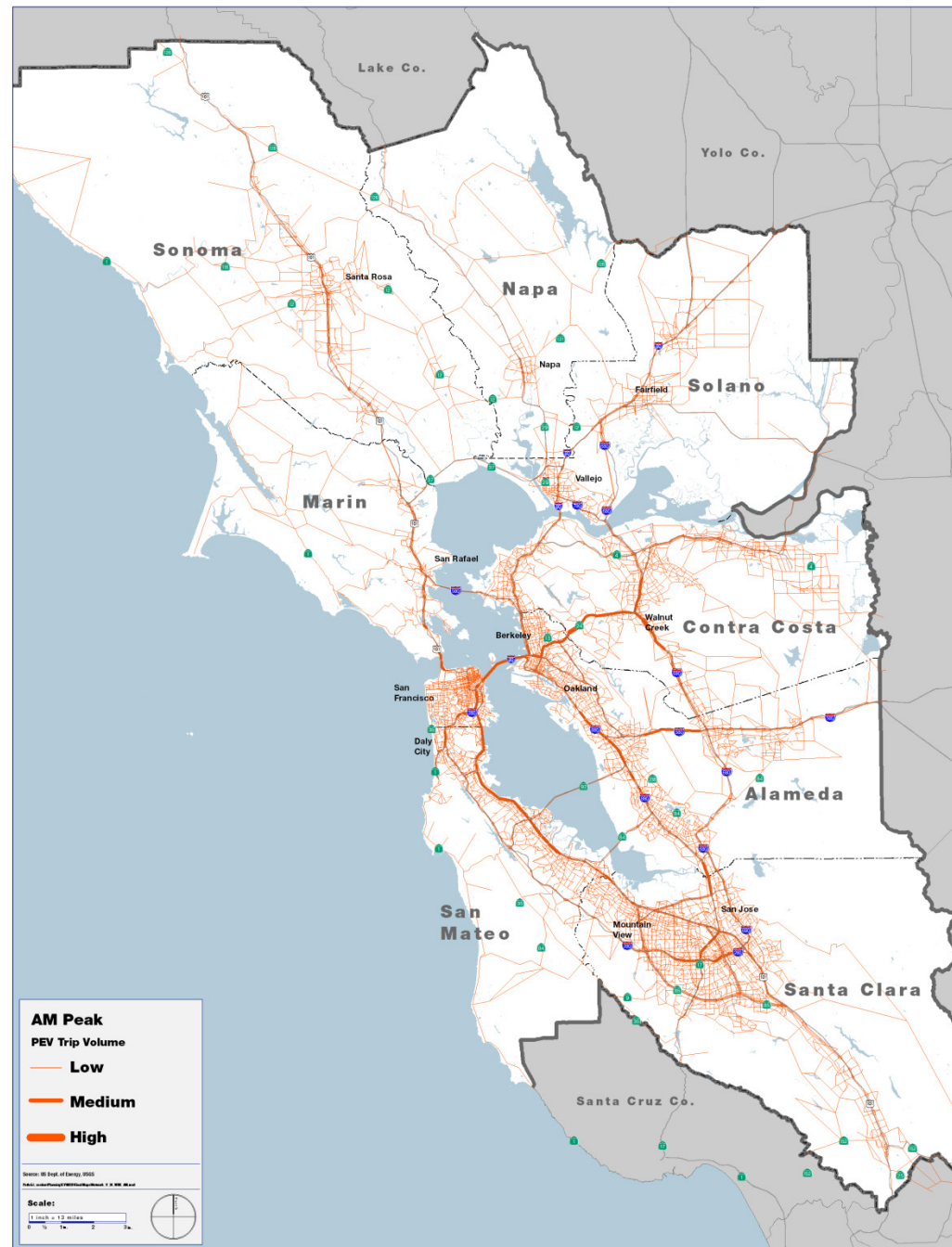- Hotels/Recreation Sites
- Parking Garages

Source: MTC GIS Unit, Fehrs & Peers, ICF

Siting for Opportunity Charging
(DC Fast Chargers)

PEVs are parked for only short periods.

Heavy PEV Volume Corridors

Typical Locations:
- Interstate Highways
- Shopping Centers
- Commuting/Recreation Roads

AM Peak

PEV Trip Volume

— Low

— Medium

— High

Source: US Dept. of Energy, USGS

Scale:
1 inch = 13 miles
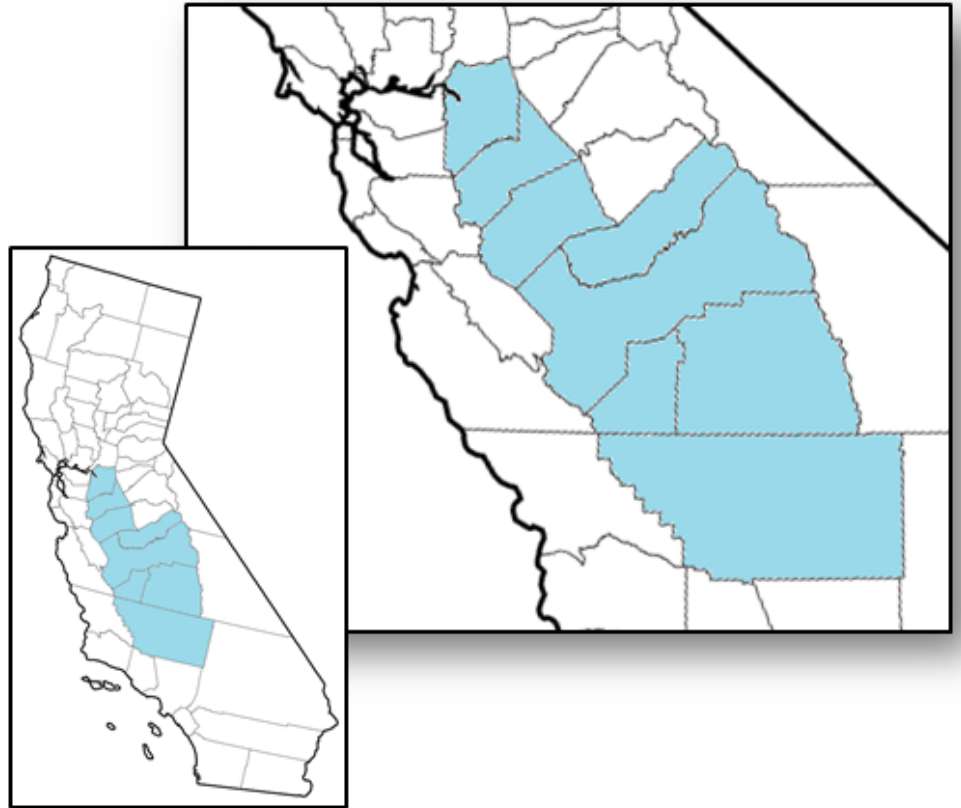0   ½   1m   2   2m

San Joaquin Valley PEV Readiness Plan

Develop a readiness plan to support the successful introduction of PEV and strategic development of EV charging infrastructure in the region.

Region:
Fresno, Kings, portion of Kern, Madera, Merced, San Joaquin, Stanislaus, and Tulare Counties
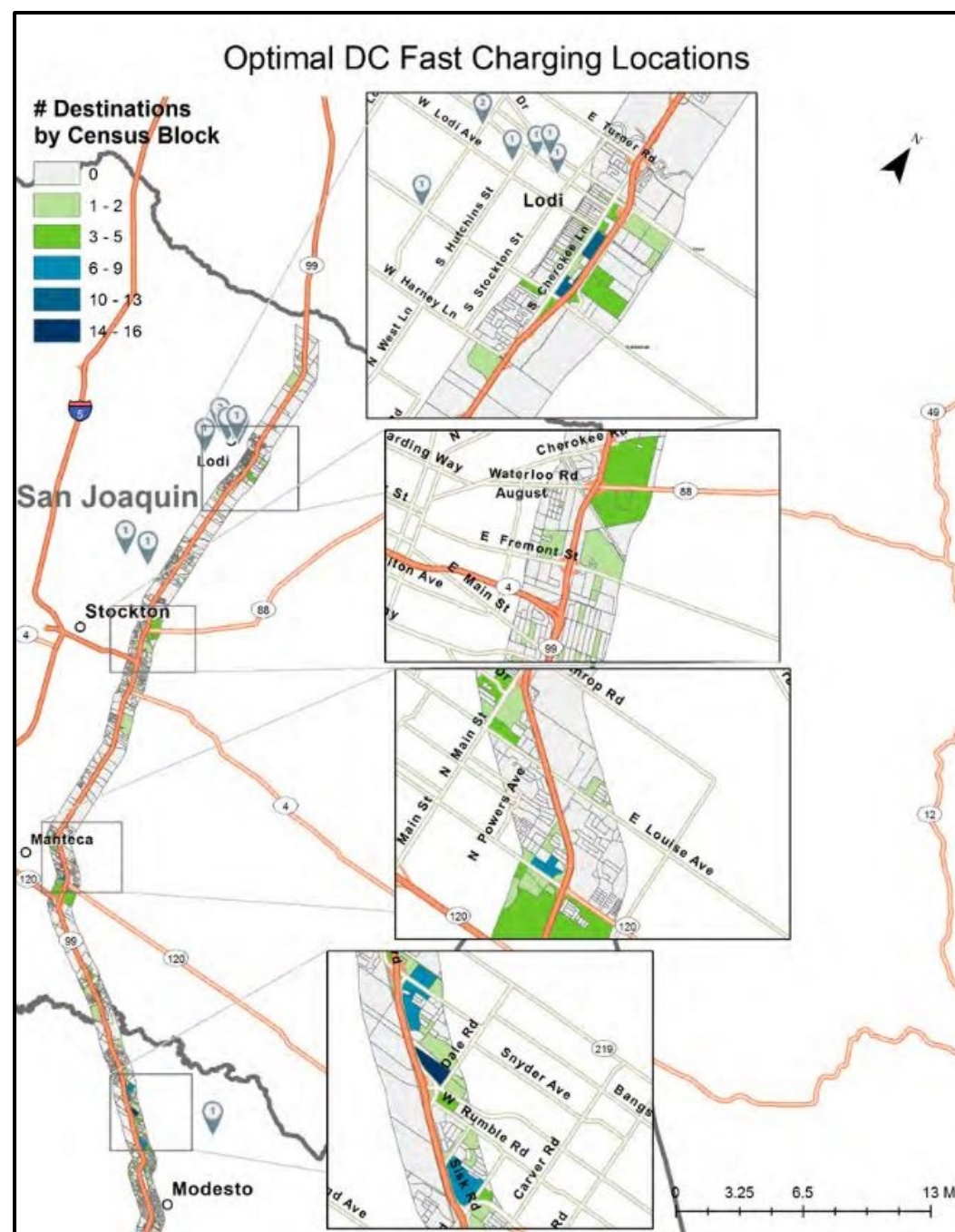
DC Fast Charging Siting Analysis

Analyzed cities along SR 99:

- Lodi, Stockton, Manteca, Modesto, Ceres, Turlock, Merced, Fresno, Tulare, Delano, and Bakersfield

Optimal Locations:

- Within half a mile of a highway exist
- Easily accessible
- Well-lit
- Offer facilities and shelter for drivers while charging
- "Destination" point

Optimal DC Fast Charging Locations

Destinations by Census Block
- 0
- 1 - 2
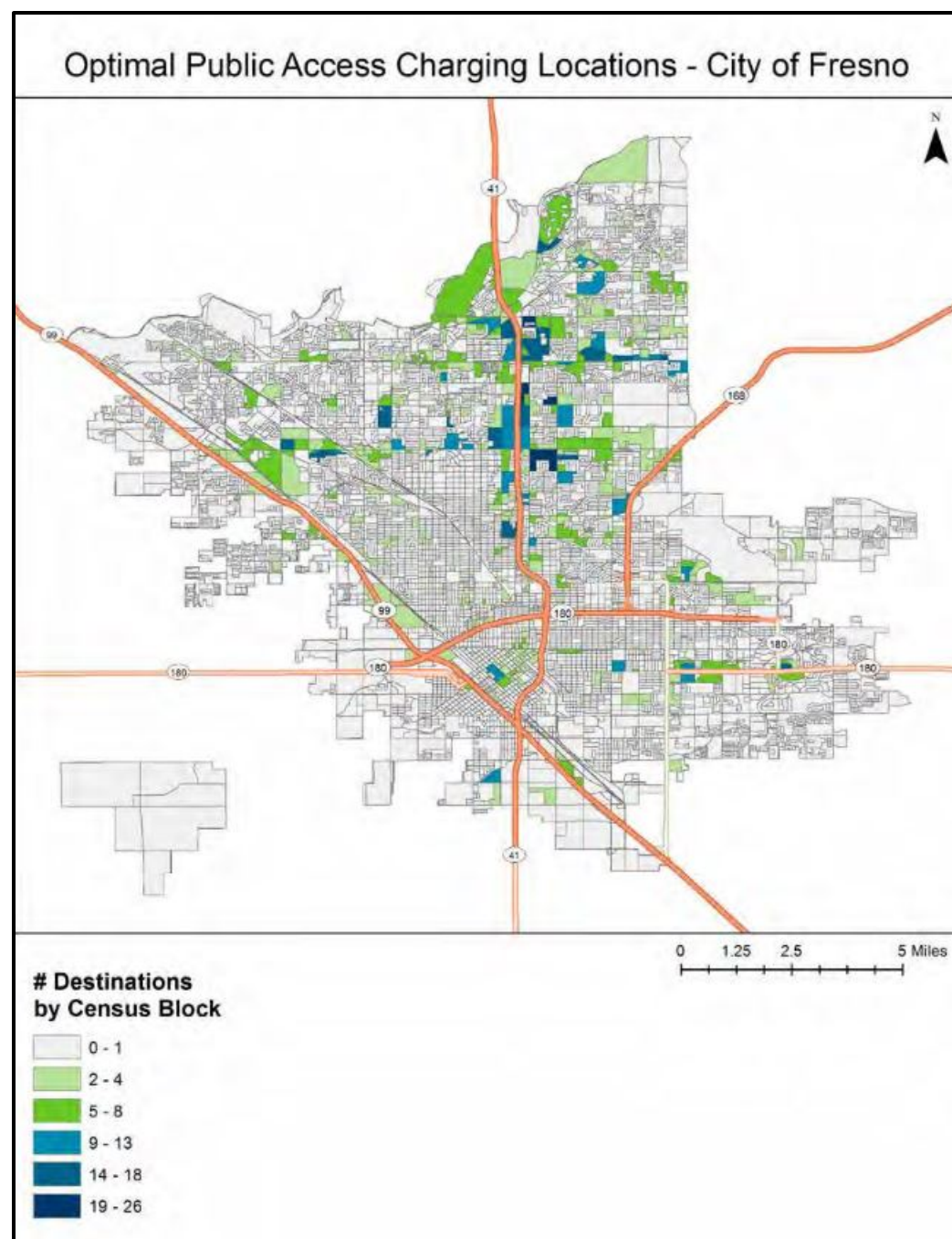- 3 - 5
- 6 - 9
- 10 - 13
- 14 - 16

Public Access Charging Siting Analysis

Analyzed 10 cities:
- Lodi, Stockton, Manteca, Modesto, Ceres, Turlock, Merced, Fresno, Tulare, Delano, and Bakersfield

Each city mapped to identify optimal locations for public access charging by census block.

Census blocks with high densities of destinations had the greatest potential to host Level 2 public charging

Optimal Public Access Charging Locations - City of Fresno

Destinations by Census Block
- 0 - 1
- 2 - 4
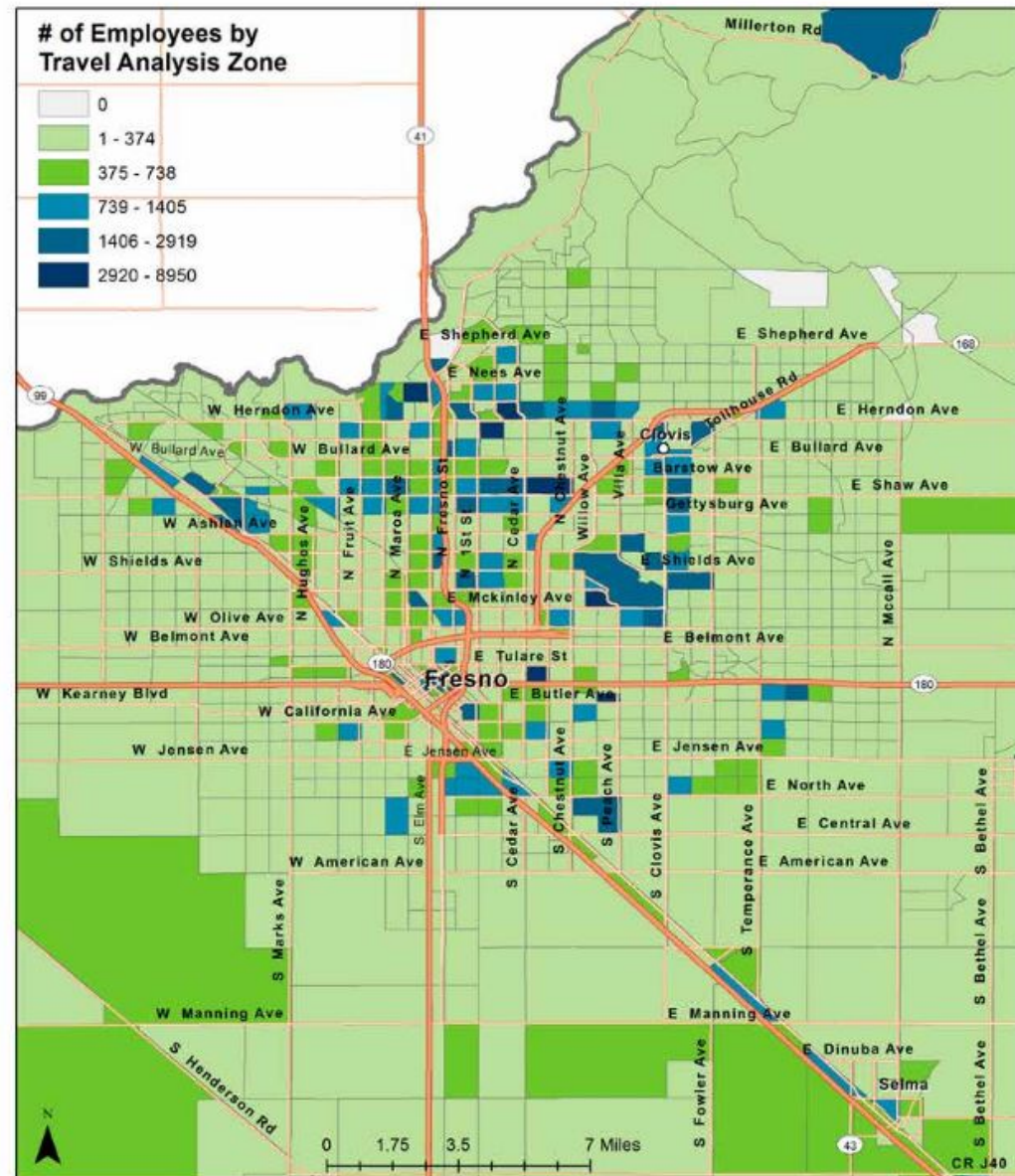- 5 - 8
- 9 - 13
- 14 - 18
- 19 - 26

Workplace Charging Siting Analysis

Land use data to understand total number of employees located in a travel analysis zone.

Analysis assumes that zones with more employees will likely contain higher number of PEV drivers.

Employee density maps provided for the cities of Bakersfield, Clovis, Fresno, Visalia, and the counties of Fresno, Kern, and Tulare.

Optimal Workplace Charging Locations - Fresno

# of Employees by Travel Analysis Zone

	0
	1 - 374
	375 - 738
	739 - 1405
	1406 - 2919
	2920 - 8950

Why Regional Readiness Planning Matters

How Does Utilization of Non-Residential EVSE Compare Between those Installed in Oregon in Planned versus Unplanned Locations?
Idaho National Labs, April 2015

- *Significant planning effort for non-residential level 2 charging station siting undertaken in the Portland area*
- *74% of the EV Project's available EVSE were placed in the predicted high utilization zones.*
- *Overall, EVSE placed in predicted high utilization zones experience 87% greater charge events per week than those outside those zones.*
- *EVSE placed in predicted high utilization zones had average vehicle connect time periods 4.4 times longer than those outside these zones.*