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AB 2127 Charging Infrastructure:
Other Programs to Accelerate EV Adoption

Noel Crisostomo, Fuels and Transportation Division
August 4, 2020
Integrated Energy Policy Report

Outline

- AB 2127 Directive on “Other [needed charging infrastructure] Programs”
- Purpose of Transportation Electrification Regulatory Policies Act (TERPA) Concept
- How could TERPA work?
  - A hypothetical process flow using Charging Infrastructure Deployment Strategies to explain the analysis and delivery of one charging use case

- For reference, see prior presentations on this topic in the CPUC’s Transportation Electrification proceedings and CEC’s June IEPR workshop:
  - Benchmarking the Costs of Charging Infrastructure And Services (link)
  - Investor-Owned Utility Roles in Transportation Electrification (link)
  - Lessons Learned from Electricity Policy for Transportation Electrification (link)

...Consider all necessary charging infrastructure, including, but not limited to:

	Road and Highway Electrification				Other EVs
Existing Chargers	***Counting Chargers***				
	Including in Low-income Communities ***(SB 1000)***				
Future Chargers	***Electric Vehicle Infrastructure Projections (EVI-Pro 2)***	***EVI-Pro RoadTrip***	***Widespread Infrastructure for Ride-hailing EV Deployment (WIRED)***	***Medium- & Heavy-Duty EVI-Projections (HEVI-Pro)***	***Off-Road, Port and Airport Electrification***

Charging Hardware and Software ***(Interoperability and Equipment Standards)***

Make- Ready Electrical Equipment ***(Building Codes & EVSE Deployment & Grid Evaluation, EDGE)***

Other Programs to Accelerate the Adoption of Electric Vehicles ***(Incentives, Investment, others)***

Energy Commission Staff 2019 IEPR on March 11 presentation

Purpose of TERPA

Accelerate **widespread transportation** ***electrification*** **while** ***leveraging*** **limited public funds with private capital.**

We could rise to the charging challenge by tuning our efforts:

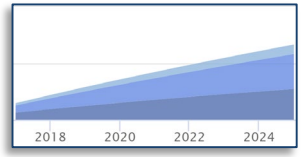
Speed: Increase installation rate

Scope: Maximize eMiles enabled

Scale: Manage public investments

How could TERPA work?

Assess The Market



Qualify EVSPs & Technology

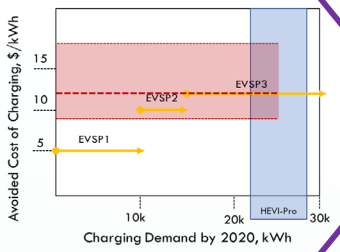
Business Models

Confirm Charging Demand

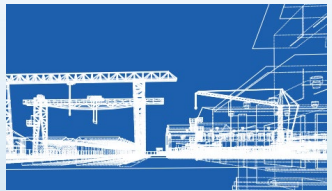
Acquire Sites

Program Administrator

Reverse Auction
- Bids → Supply
- Laws → Demand



Assess Regional "Best Fit" Projects



Source Funding
- Ratepayer
- Taxpayer
- Feepayer

Invest In & Deliver Projects

Discover WTP

×

Select Supply Portfolio

=

Budget Public Investment

Public Investment ($)

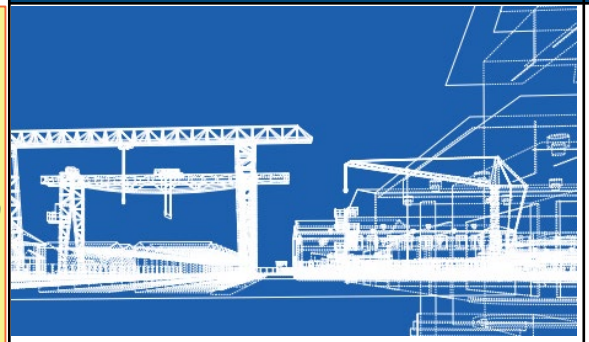
eMiles Enabled (kWh)

Tailor Awards to EVSPs

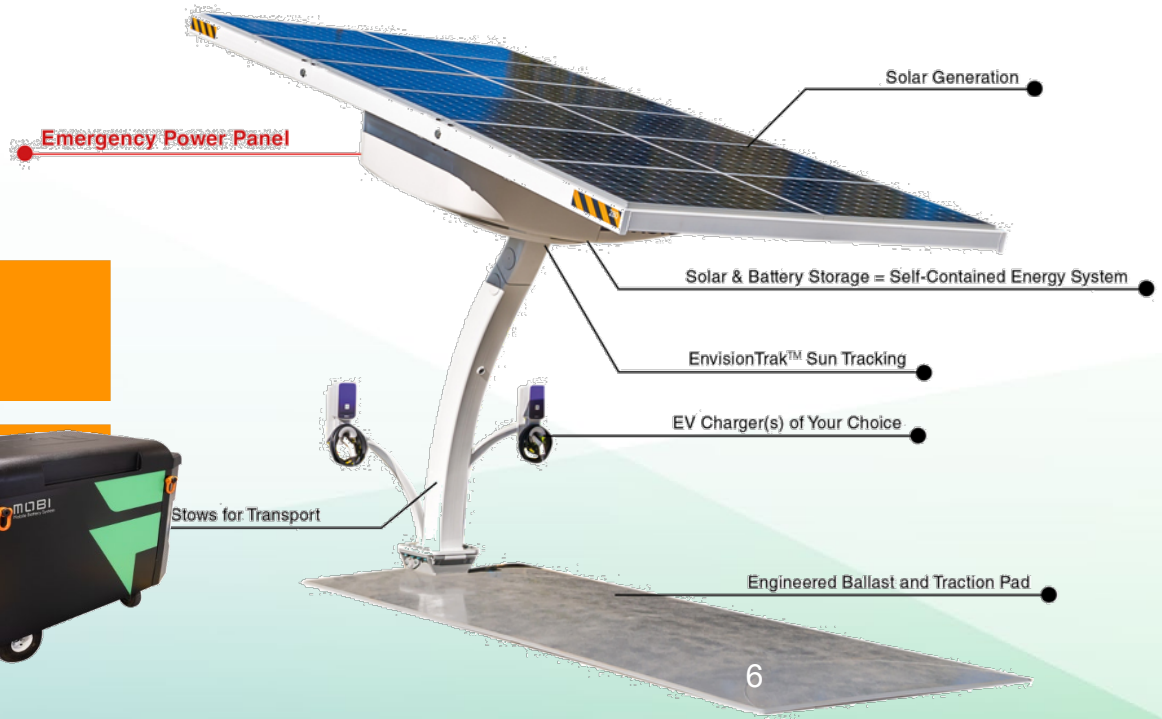
Alleviate Market Constraints

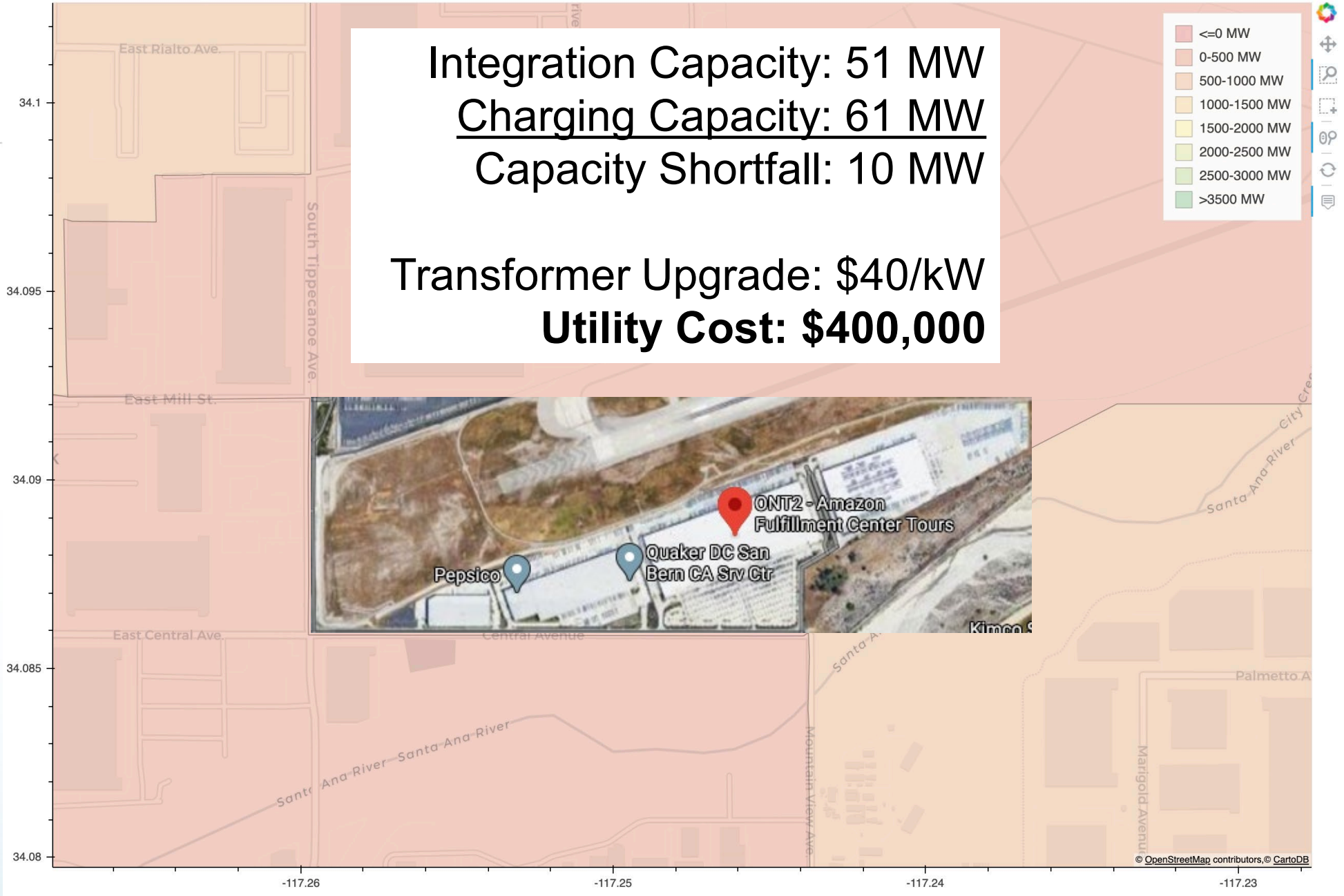
Utilities Serve EVSPs' Projects

A. Assess regional "best fit" projects

	Assess Needs	Harmonize to Scale
Local & Project Level		
	Regional Readiness Plans and Community Blueprints	**Portfolio of Solutions Best Fit for the Local Environment**

- The Port of Long Beach Community Electric Vehicle Blueprint (2019)
  - 100% ZE Drayage Trucks by 2035
  - Regional infrastructure plans for ZE Drayage Trucks to be developed



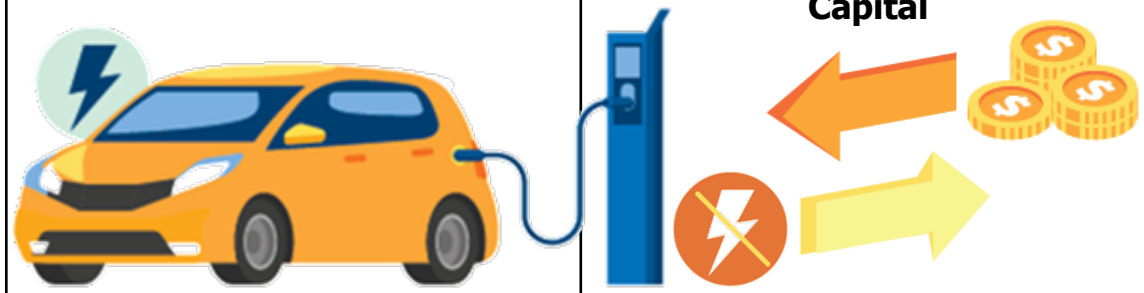


EDGE Example: PepsiCo, Quaker, and Amazon Distribution Centers, San Bernardino

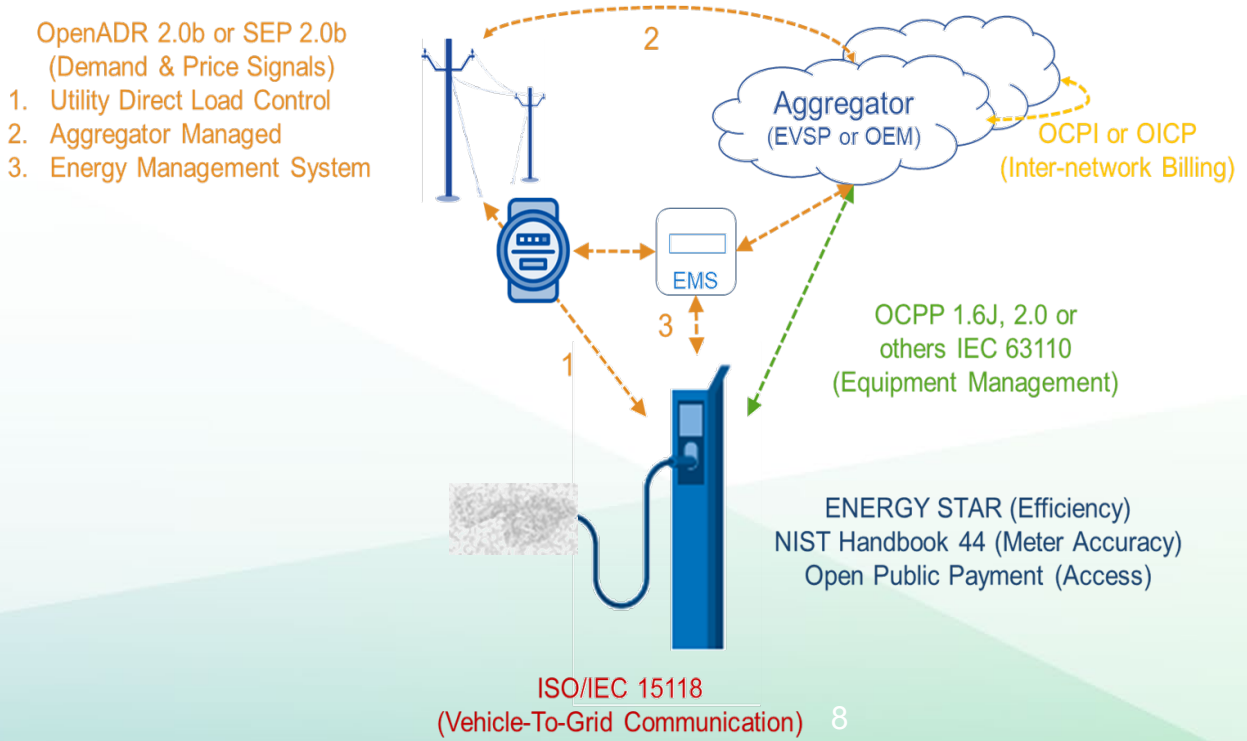
Prices and quantities illustrative only

B. Qualify eligible suppliers

Local & Project Level ↔ Statewide Ecosystem

Harmonize to Scale	Grow Partnerships
Interoperable: Convenient, Controllable, and Competitive 	**Lever Public and Ratepayer Investment with Private Capital**
	 **Project Finance and Innovative Economic Models**

- CEC qualifies the EVSPs to participate in the RFPs via a two step analysis:
  - Viability to conduct due diligence of company incorporation and model
  - Technical standards to ensure quality



B. Eligible EVSPs prepare bids

$$Avoided\ Cost\ of\ Charging\ in\ year\ for\ EVSP\ \left(ACC_{y,EVSP}\right) = \frac{Public\ Investment\ (\$)}{\frac{Capability\ (kW \times h)}{Station} \times \frac{Stations\ Installed}{Year}}$$

EVSP Viability

Deployment Readiness

$$eMiles\ Enabled\ in\ year\ for\ EVSP\ \left(E_{y,EVSP}\right) = \frac{kW \times \left(h_{measured} + h_{projected}\right)}{Station} \times \frac{Stations\ Installed}{Year}$$

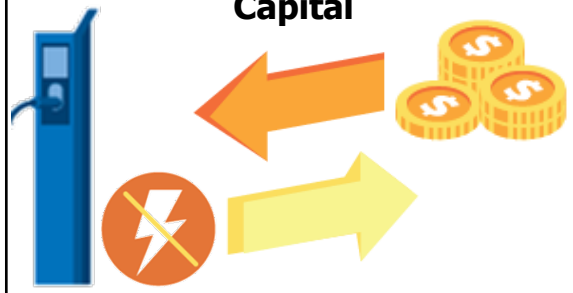
Depth of utilization for current or future technologies and Geographic Breadth of Network

B. Solicit supply (reverse auction)

Local & Project Level ↔ Statewide Ecosystem

Grow Partnerships

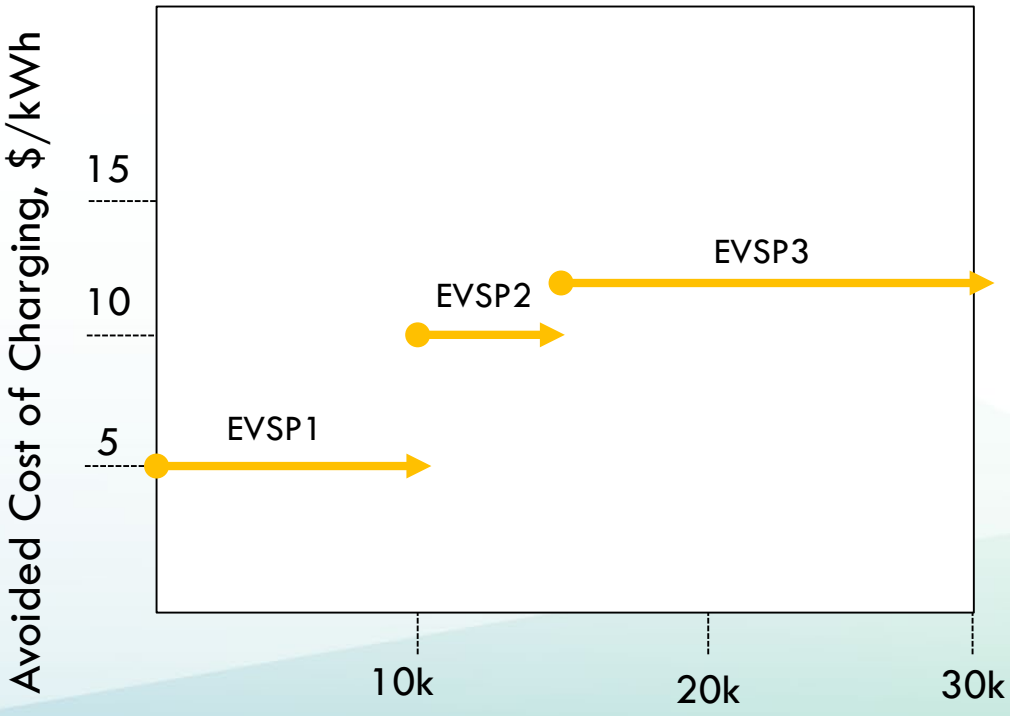
Lever Public and Ratepayer Investment with Private Capital



Project Finance and Innovative Economic Models

2020 SCAG Drayage Truck RFP: Responses

Bid	ACC ($/kWh)	E (kWh/y)	Project Description
EVSP1	5	10,000	Smart Depot EVSEs
EVSP2	10	5,000	Mobile EVSEs
EVSP3	12	15,000	Depot + mobile EVSE w/ Microgrid



Rank-ordered supply curve for the cost of charging energy (E_{EVSP}, ACC_{EVSP})

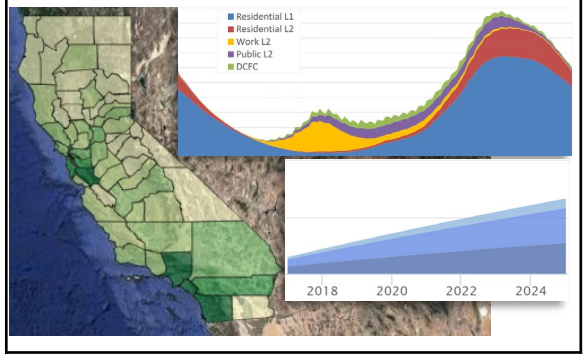
Prices and quantities illustrative only

C. Confirm charging demanded

Statewide Ecosystem

Assess Needs

Expand Electric Vehicle Infrastructure Projections



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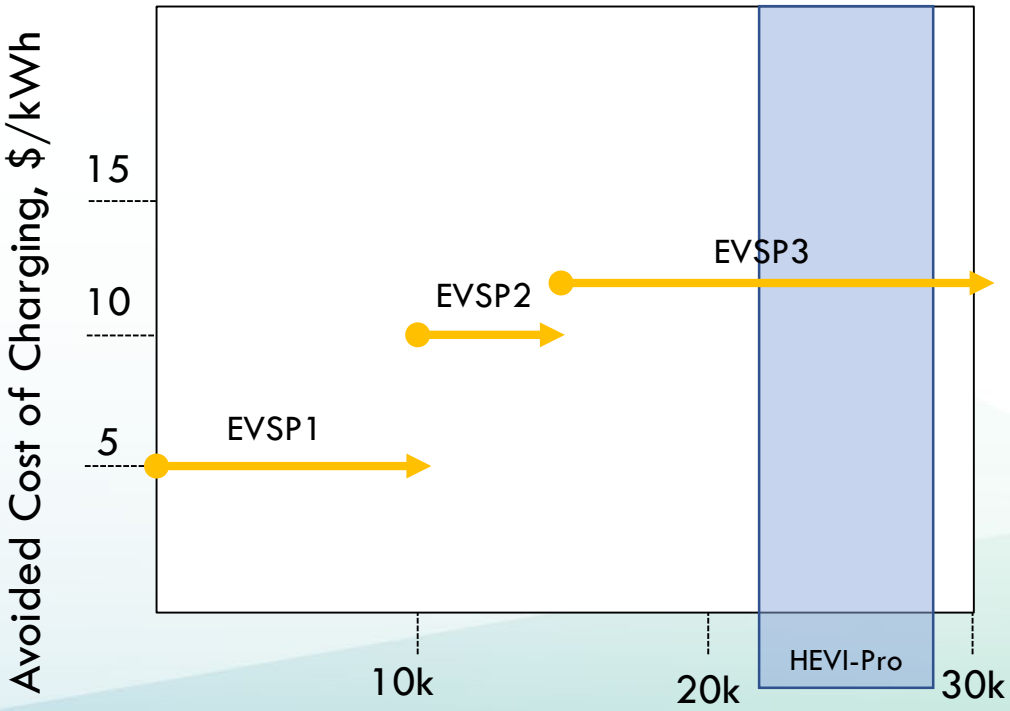


e.g. 25,000 kWh of electricity is required by regulation (Advanced Clean Trucks) in the South Coast Air Basin

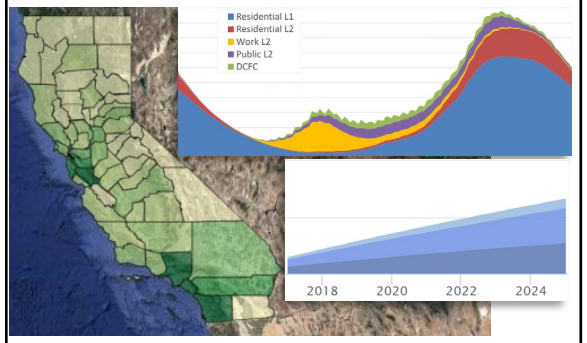
Prices and quantities illustrative only

D. Discover willingness to pay

Statewide Ecosystem

Assess Needs

Expand Electric Vehicle Infrastructure Projections



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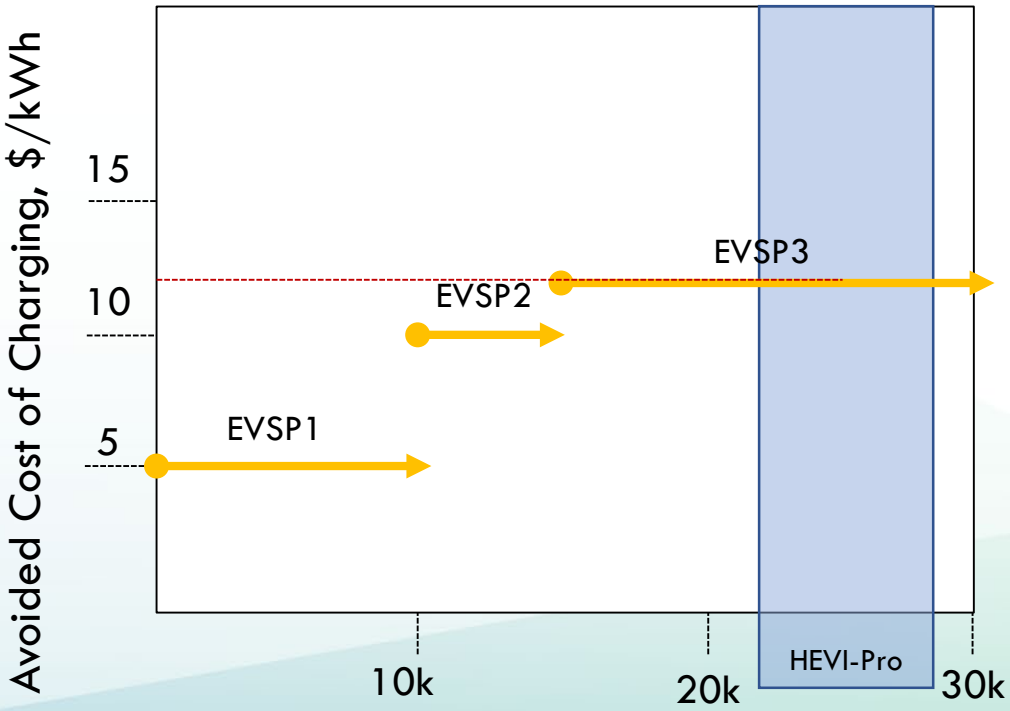


Cost of sufficiently supplying regulatory demand = $12/kWh

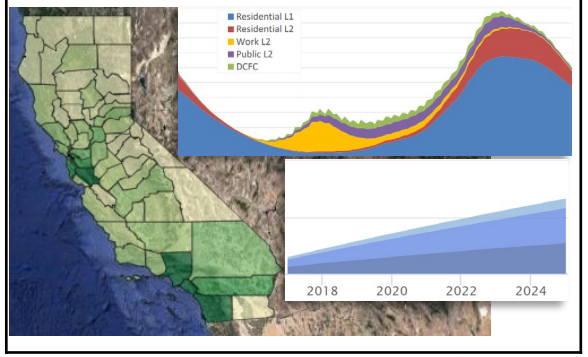
Prices and quantities illustrative only

E. Analyze sensitivities

Statewide Ecosystem

Assess Needs

Expand Electric Vehicle Infrastructure Projections



2020 SCAG Drayage Truck RFP: Responses

Bid	ACC ($/kWh)	E (kWh/y)	Project Description
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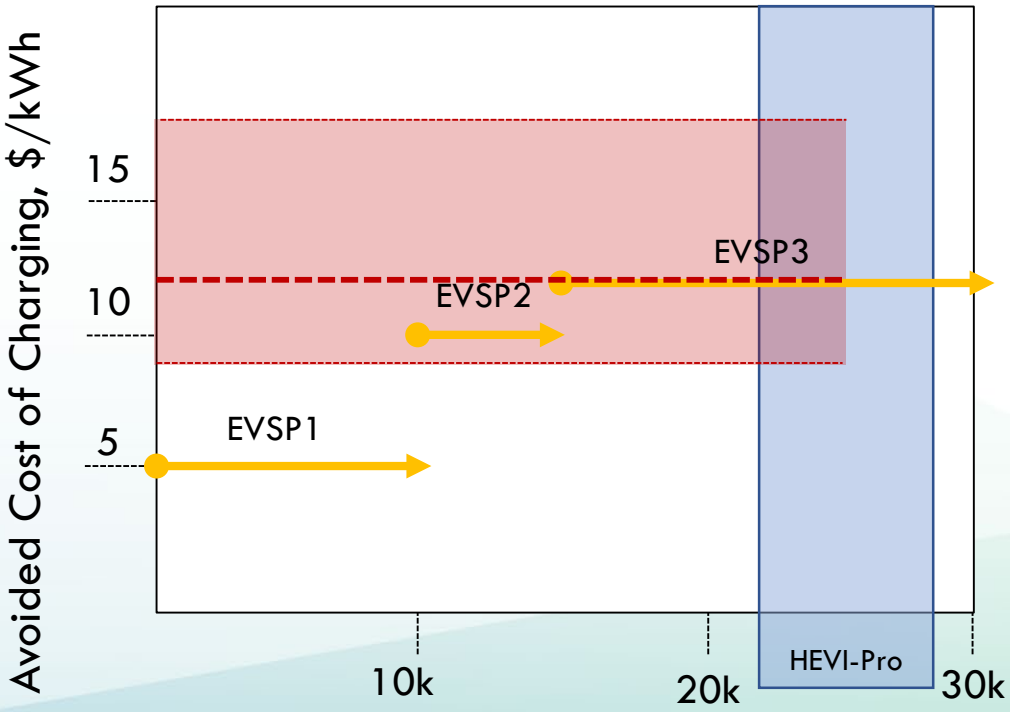


e.g. Supply

Grid controller (n-1) = $17/kWh

Cheaper Storage = $9/kWh

e.g. Demand

New/accelerated policy

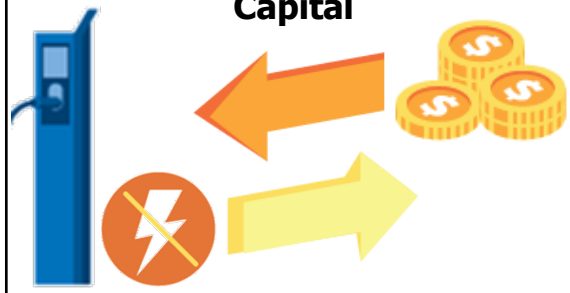
Prices and quantities illustrative only

F. Select sufficient supply portfolio

Local & Project Level ↔ Statewide Ecosystem

Grow Partnerships

Lever Public and Ratepayer Investment with Private Capital



Project Finance and Innovative Economic Models

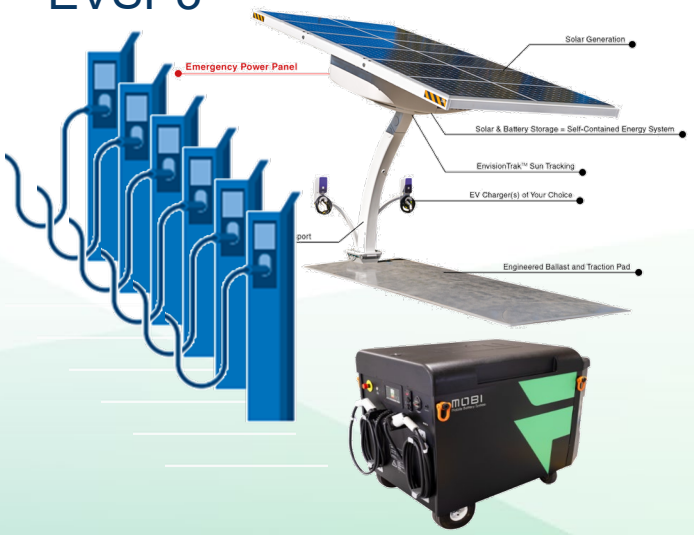
2020 SCAG Drayage Truck RFP: Selections

Awards	ACC ($/kWh)	E (kWh/y)	Project Description
EVSP1	5	10,000	Smart Depot EVSEs
EVSP2	10	5,000	Mobile EVSEs
EVSP3	12	10,000	Depot + mobile EVSE w/ Microgrid

EVSP1

EVSP2

EVSP3



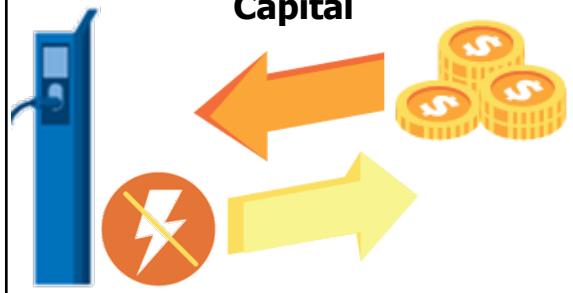
Prices and quantities illustrative only

G. Budget the public investment

Local & Project Level ↔ Statewide Ecosystem

Grow Partnerships

Lever Public and Ratepayer Investment with Private Capital



Project Finance and Innovative Economic Models

2020 SCAG Drayage Truck RFP: Investments

Awards	At Cost	Δ = ACC $_{MC}$ – ACC $_{EVSP}$	Aggressive
EVSP1	$50,000	$70,000	$120,000
EVSP2	$50,000	$10,000	$60,000
EVSP3	$120,000	0	$120,000
TOTAL	**$220,000**	**+ $80,000**	**$300,000**

At Cost Public Investment

$= \sum_1^3 ACC_{EVSP} \times E_{EVSP}$

Bid cost from each selected EVSP

Aggressive Public Investment

$= ACC_{MC} \times D_{HEVI-Pro}$

Marginal Cost or "Market Clearing"

Prices and quantities illustrative only

G. Budget the public investment

Electric For All

Robust Supplier Ecosystem & Installation Workforce

Construction, Energization, and Sustained Operations

Local & Project Level ↔ Statewide Ecosystem

2020 SCAG Drayage Truck RFP: Investments

Awards	At Cost	Δ = ACC $_{MC}$ – ACC $_{EVSP}$	Aggressive
EVSP1	$50,000	$70,000	$120,000
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EVSP3	$120,000	0	$120,000
TOTAL	**$220,000**	**+ $80,000**	**$300,000**

At Cost Public Investment
$= \sum_1^3 ACC_{EVSP} \times E_{EVSP}$

Aggressive Public Investment
$= ACC_{MC} \times D_{HEVI-Pro}$

Additional $80,000 ***could*** alleviate market constraints:

- **Add Local Permitting Staff**
- **Train High Voltage Workforce**

…and ***could be*** less expensive than the $400k grid upgrade

Prices and quantities illustrative only

H. Tailor awards to EVSPs

Electric For All

Robust Supplier Ecosystem & Installation Workforce

Construction, Energization, and Sustained Operations

Local & Project Level ↔ Statewide Ecosystem

2020 SCAG Drayage Truck RFP: Investments

Awards	At Cost	Barrier	Need/Use of Public $
EVSP1	$50,000	Low initial fleet use	Phase-in $/kW charges
EVSP2	$50,000	Small scale manufacturing	Facility Equipment CapEx
EVSP3	$120,000	Interconnection cost	Grid Controller CapEx
TOTAL	**$220,000**		

EVSP1

EVSP2

EVSP3

Prices and quantities illustrative only

I. Utility supports installations

Electric For All

Robust Supplier Ecosystem & Installation Workforce

Construction, Energization, and Sustained Operations

Local & Project Level ↔ Statewide Ecosystem

- Construct needed upgrades
- Energize stations
- Design economic rates

Program Administrator

Rate Relief

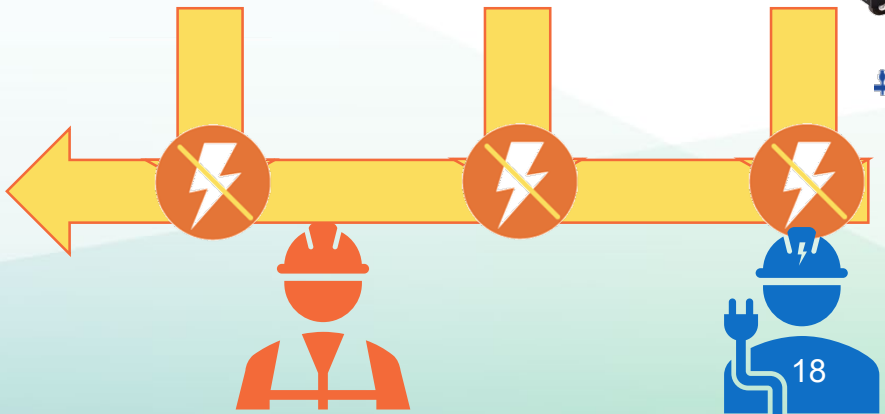
Manufacturing

Interconnection

EVSP1

EVSP2

EVSP3



How could TERPA work? (Summary)

Phase 1: Assess The Market

A. Region **analyzes needs** and identifies locally-appropriate project types

B. CEC **qualifies** EVSPs upon **technical and viability bases**. Program Administrator (PA) **holds a reverse auction, quantifying the cost of charging** from EVSPs.

C. CEC **confirms the inelastic demand for charging** consistent with California laws

D. PA **pools funds** and compares supply with demand to discover a **willingness to pay**

E. PA and CEC **analyze supply or demand sensitivities** (e.g. non-EV factors, regulation, innovation, new policy, …) to quantify and mitigate risks or market power

Phase 2: Invest In & Deliver Projects

F. PA **selects the cost-beneficial supply portfolio** from EVSPs to meet the electrification objective

G. Consulting with CEC and Agencies, PA **budgets the public investment needed** to deliver the portfolio according to the state of the broader market

H. PA **tailors the investments** in EVSPs according to their barrier(s) to entry

I. Utilities **serve load, energize, and offer economic rates** to the EVSPs' projects

If further developed, TERPA could:

Speed deployment on multiple fronts by expanding manufacturing & offering policy certainty to the workforce.

Broaden **scope** of solutions and promote fair competition among them based on the cost to enable e-miles.

Scale funding reach, fronting VGI value of saved upgrade to customers & offering predictable incentives to innovate.

We welcome additional exploration and your feedback!

Thank you! Questions or comments?

Contact:

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Webpage:

https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127