Hesperia -30 Acres

CIOproUSA

Date: 6/6/2024

City: Hesperia, CA

0 Glendale Ave

Consultants: Philip Skipitaris and Dr. Francis, Tesero Sol

Potential Solutions

Solar+BESS+EV: This proposed solution strategically combines solar PV generation, battery energy storage, and EV fast charging, leveraging California's Rule 21 export-controlled interconnection framework and available incentive programs. The system is designed for efficient land use, grid reliability, and sustainable transportation.

For a system with 4 180kw EV chargers, 866 kW of solar, and a 0.4 MW / 1.6 MWh battery, the estimated total cost is approximately **$1,427,524**. A larger configuration with 1.3167 MW of solar and the same battery is estimated at **$1,540,136**.

Key characteristics:

- **Renewable and Sustainable**: Relies entirely on solar power, a renewable energy source, making it environmentally friendly.
- **Energy Independence**: Increases energy independence by generating power onsite and reducing reliance on the grid.
- **Demand Response**: Can be used to reduce electricity consumption from the grid during peak demand times, potentially lowering energy costs.
- **Resilience**: Enhances resilience by providing a backup power source during grid outages.

SCE Rule 21::Rule 21 outlines the interconnection process for generating facilities, including battery energy storage systems, to the utility's distribution system, with the California Public Utilities Commission (CPUC) having jurisdiction.

Export-Controlled Configuration (PV + BESS with Limit)

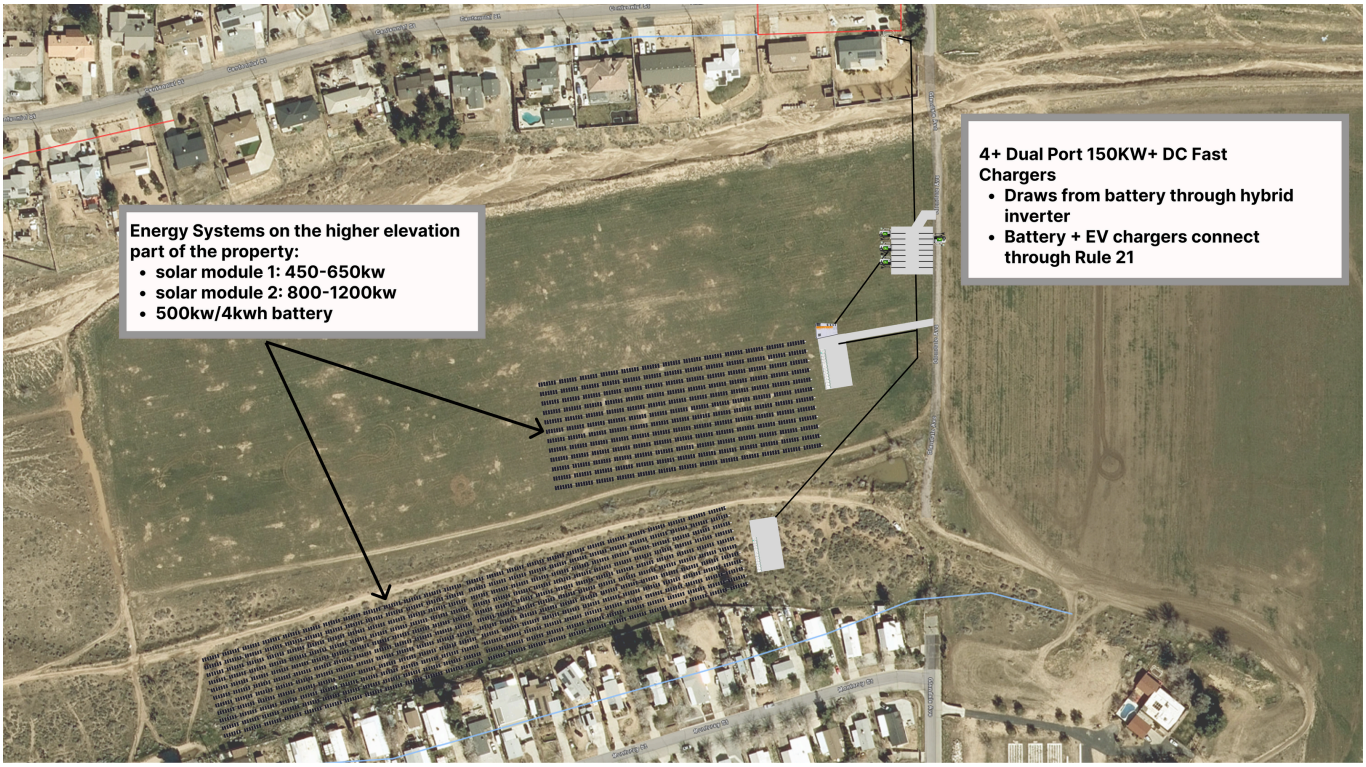
- System exports to the grid, but within a **fixed export limit**
- Uses a **certified Power Control System (PCS)** or **Net Generation Output Meter (NGOM)**
- SCE treats it like generation, but less strictly than unrestricted export

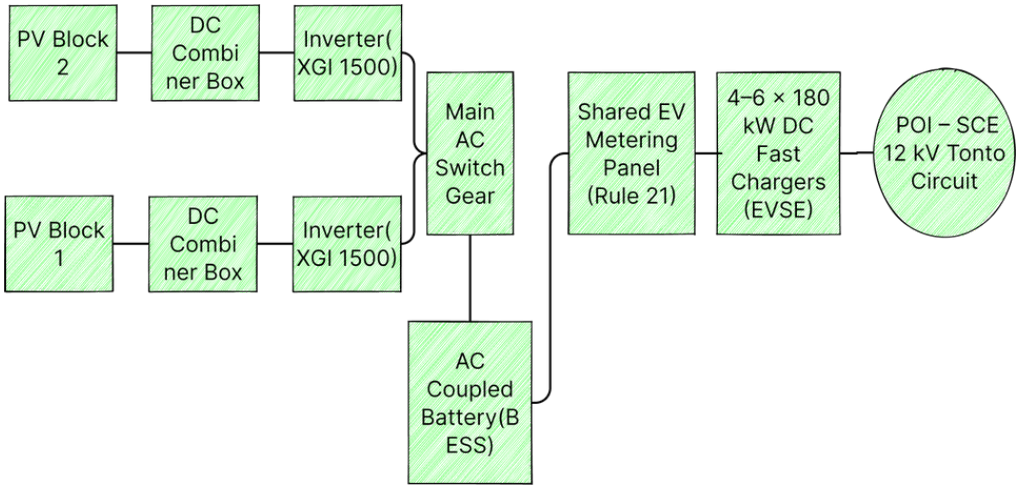
Best for:

- Earning credits under **NEM 2.0/3.0** or other compensation programs
- Providing grid support

Potential System

In this setup, the battery energy storage system (BESS) is interconnected to the 12 kV grid, and the DC fast chargers draw power directly from the battery. The battery is charged by onsite solar generation and serves as the primary energy source for EV charging. This configuration reduces real-time demand on the grid, supports clean transportation, and enhances system resilience by enabling reliable, onsite energy delivery.





System Options	Solar(kw)/	Batteries(kw/kwh)	Chargers
Module 2	866.25	**400/1600**	**4 - 180kw Chargers**
Combined Modules	**1316.7**	**800/3200**	**6 - 180kw Chargers**
Without FCCP	**450.54**	**200/800**	**3 - 60kw Chargers**

FCCP: Fast charger california project funding

System Specification Analysis

- **Battery size** is the biggest driver of grid independence.
- Systems with **866 kW or more PV** and **≥1.6 MWh battery** balance is sufficient for a charging station with 2.8 average usage hours per port daily.
- Systems with 450 **kW or more PV** and **≥1.2 MWh battery** balance is sufficient for a charging station with 1.7 average usage hours per port daily.

4 180kw EV Charger System Specification Sensitivity Analysis based on usage, battery size(watt hours) and Solar module size(Watts)

Energy System Size(W)	Battery Size(Wh)	Duration Energy % Needed by Grid	max_output(W)	average usage(hrs)
866250	2000000	0.0491342	2000000	1.7
450450	1200000	0.08235931	1200000	1.7
866250	1200000	0.066991344	1200000	1.7
450450	1600000	0.06612554	1600000	1.7
866250	800000	0.23398268	800000	1.7
450450	800000	0.31915584	800000	1.7
1086250	2000000	0.07099567	2000000	2.816666667
450450	2000000	0.27467534	2000000	2.816666667
866250	1600000	0.25638527	1600000	2.816666667
1316700	1600000	0.17867966	1600000	2.816666667
1691250	1600000	0.14978355	1600000	2.816666667
1086250	2000000	0.4323593	2000000	4.733333333
1691250	2000000	0.3909091	2000000	4.733333333

“Duration Energy % Needed by Grid” refers to the **percentage of total energy required over a given time period** (usually daily or hourly) that **must be supplied by the grid**, because the **solar + battery system cannot meet 100% of the load**.

Tax Credits

- **Section 48E -** Clean Electricity Investment Tax Credit (ITC) - **Base Credit (30%)**: Applies to solar PV and battery storage systems that meet prevailing wage and apprenticeship requirements.
- **Section 30C -** Alternative Fuel Refueling Property Credit - **Base Credit (30%)**: Covers up to 30% of the cost for EV charging equipment, capped at $100,000 per charger, if installed in a qualified low-income or rural area
- **+10% Domestic Content Bonus**: For using U.S.-manufactured steel, iron, and components.
- **+10% Energy Community Bonus**: For projects located in fossil fuel-dependent or economically distressed areas.
- **+10%–20% Low-Income Bonus (competitive)**: For projects under 5 MW located in low-income census tracts or on tribal land.

Eligible for 30C Tax Credit until 2029

Low Income Community Eligibility: Blue implies eligibile

In an Eligible Energy Community

	Investment Tax Credit	Production Tax Credit(cents per kwh)
Generating Facility48E Base:	30%	
EV Charging Related 30C Base:	30%	2.75
Domestic Content Bonus:	10%	0.3
Energy Community Bonus:	10%	0.3
Low-Income Community Bonus:	10%	

Grant and Program Funding

Fast Charge California – Project 1 (CEC): A state-led initiative supporting deployment of **high-powered DC fast chargers (150 kW+)** across key corridors and urban hubs.

- **Incentives:** Up to **100% of eligible project costs**, based on charger capacity.
- **Caps per Charging Port:**
  - 150–274.99 kW: **$55,000**
  - 275 kW or more: **$100,000**
- **Port Limits per Site:** Minimum **4**, Maximum **20** (funding capped accordingly)
- **Eligibility Focus:** Disadvantaged communities (DACs), priority equity zones, public access, and grid-compatible locations.

Charge Ready – Southern California Edison (SCE): Infrastructure and rebate program supporting EV charger installations across various sectors.

- **Multi-family housing**, **workplaces**, **fleets**, and **public sites**
- **Incentives:** Covers **make-ready infrastructure** and provides **charger rebates**
- **Equity Focus:** Enhanced support for sites in DACs, up to **100% of costs covered**

SoCalREN – Public Agency Programs: The Southern California Regional Energy Network provides **technical and financial assistance** for public agency energy and EV projects.

- **Services Include:**
  - Site assessments, planning, procurement support
  - Project management and incentive navigation
- **Target Users:** Cities, school districts, and public institutions
- **Benefits:** No-cost advisory, assistance with incentive stacking, and alignment with climate goals

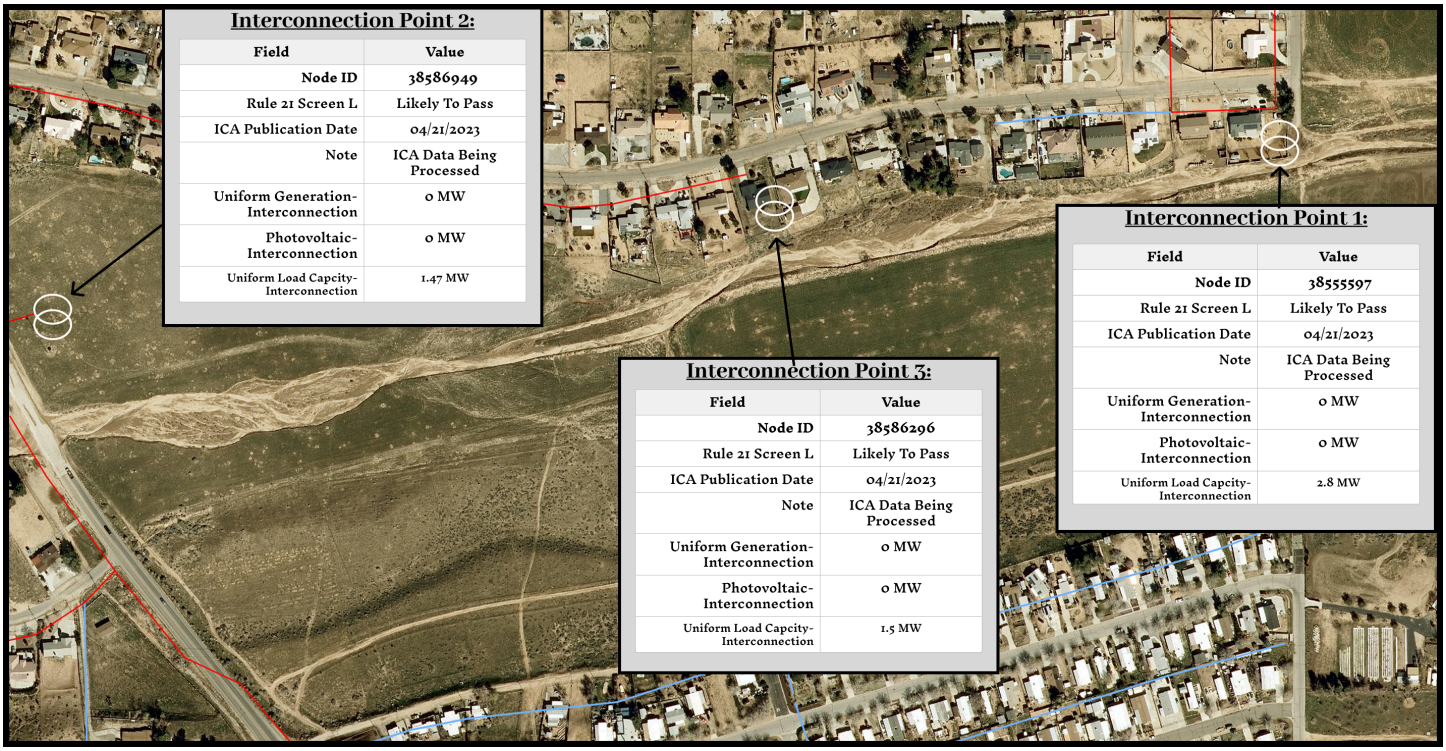
Self-Generation Incentive Program (SGIP):CPUC program offering **rebates for battery energy storage systems**, especially when paired with solar or critical loads.

- **High Rebates For:**
  - **Vulnerable populations** and **DACs**
  - **High fire-threat districts (HFTDs)**
  - **Critical facilities** (e.g., shelters, fire stations)
- **Incentives:** May cover **85–100% of project costs** for qualifying sites

Utility Interconnection(SCE)

There are **three viable interconnection points** identified within the surrounding neighborhood. Based on preliminary assessments:

- **Interconnection Point 2** is considered the **least invasive** option, offering a more straightforward path for physical connection and minimal impact on existing infrastructure.
- **Interconnection Point 1** presents the **highest load interconnection capacity**, making it suitable for projects with significant energy export or demand requirements.
- **All three points** are anticipated to meet the criteria for approval under **Rule 21**, pending further technical review and utility screening.



Interconnection		
Circuit Name:	Tonto	
Distance:	200ft-0.25Miles	interconnection point 1 and interconnection point 3 in the diagram
Voltage:	12 kV	
System Name	Victor 220/115 System	
Existing Generation (MW)	3.07	
Queued Generation (MW)	3.15	
Total Generation (MW)	6.22	

System Specification

Solar: Central Lot		
Solar System(MW):	0.45-0.65	
Panel Axis Tilt(degrees):	34	
Distance Between Tables	4.5-7.5	
Panels Power Output(W):	550	

Solar: lower Lot near Homes		
Solar System Range.(MW):	0.9-1.2	
Panel Axis Tilt(degrees):	34	
Distance Between Tables(ft)	4.5-7.5	
Panels Power Output(W):	550	

Combiner Box Comparison Table (with Soft Quotes & U.S. Manufacturing Info)

Manufacturer	Model / Type	Strings Supported	Voltage Rating	Made in USA	Soft Quote (USD)
Power Assemblies	Custom Solar Combiner Box	13–25	1000V / 1500V	Yes	**$1,850–$2,400**
Fronius	String Control 250/25	Up to 25	1000V	No	**$1,700–$2,100**
PowerHome	24 String PV Combiner Box	Up to 24	1000V	No	**$1,500–$2,000**
MidNite Solar	MNPV12 or Dual MNPV16 Configuration	12 or 32 (2×16)	600V / 1000V	Yes	**$900–$1,600** (pair of MNPVs)

U.S.-Made Inverter & Converter Recommendations (with Purpose + Soft Quote)

Category	Manufacturer	Model	Specs	Quantity (Est.)	Soft Quote (USD)
Inverter	Yaskawa Solectria Solar	XGI 1500-250	250 kW AC output, 1500V DC input, UL 1741, IEEE 1547	4 units (for ~1.3 MW system)	$22,000–$28,000 each
Inverter	Yaskawa Solectria Solar	XGI 1500-166	166 kW AC output, 1500V DC input, UL 1741, Rule 21 compliant	8 units (alternative, more granular)	$16,500–$20,000 each
DC-DC Converter	Alencon Systems	SPOT (String Optimizer)	DC-DC isolated conversion, supports up to 1500V systems	9–12 units (depends on layout needs)	$3,500–$5,000 per unit

The combined load of the battery chargers and the battery output must not exceed the maximum allowable interconnection capacity of the local 12 kV distribution network. This ensures safe and reliable operation within the limits of the distribution infrastructure and prevents overloading of utility assets

Battery Energy Storage System		
Battery Size Min(MW).:	0.4	
Battery Size Max(MW).:	~1	Dependent on Load Interconnection capacity of local distribution network and Ev Chargers
DC Scope	DC Stacks + Enclosure	
AC Scope	PCS + MV Transformer	
System Duration:	4MWh	
Charge Type:	Assymetric	

Charger System: Chargetronix Chargers		
Amount of Chargers:	2-6	60KW without FCCP 180 with to meet 150+ kw condition
Charger kw:	60-180	
Does it have Parallel Mode:	Yes	Dual Port usage
Internet Connection:	Yes	

Projected Capital Expenditures

Solar Module

Component	Count	Size	Total
Solar Module 2	1,575	550 W each (866.25 kW)	$216,563
Solar Module Combined	2,394	550 W each (1,316.7 kW)	$329,175
Structural BOS	–	–	$65,489 (avg range)
Electrical BOS (incl. DC Boxes)	16	13 & 25 strings	$163,722 (incl. $12,800)
Solar Module 2	–	1,316.7 kW	**$445,774**
Solar Module Combined Total			**$558,386**

Battery+EV+Infrastructure

Component	Count	Size	Total
Battery System	1	0.4 MW / 1.6 MWh	$440,000
Inverter	8	166 kW AC, 1500V DC	$146,000
Transformer	1	2.5 MVA	$30,000
Converter (DC-to-DC)	9–12	1500V DC	$45,750
EV Chargers	4	180 kW (720 kW total)	$320,000
Battery + Integration Subtotal	–	–	**$981,750**

Component	Size	Total
Total Project CAPEX Solar module 2 only	886.25 kW + 1.6 MWh–	**$1,427,524**
Total Projected CAPEX Solar Module 1 and 2 Combined	1,316.7 kW + 1.6 MWh	**$1,540,136**