



**CALIFORNIA**  
High-Speed Rail Authority

# Rail Electrification Coalition Workshop

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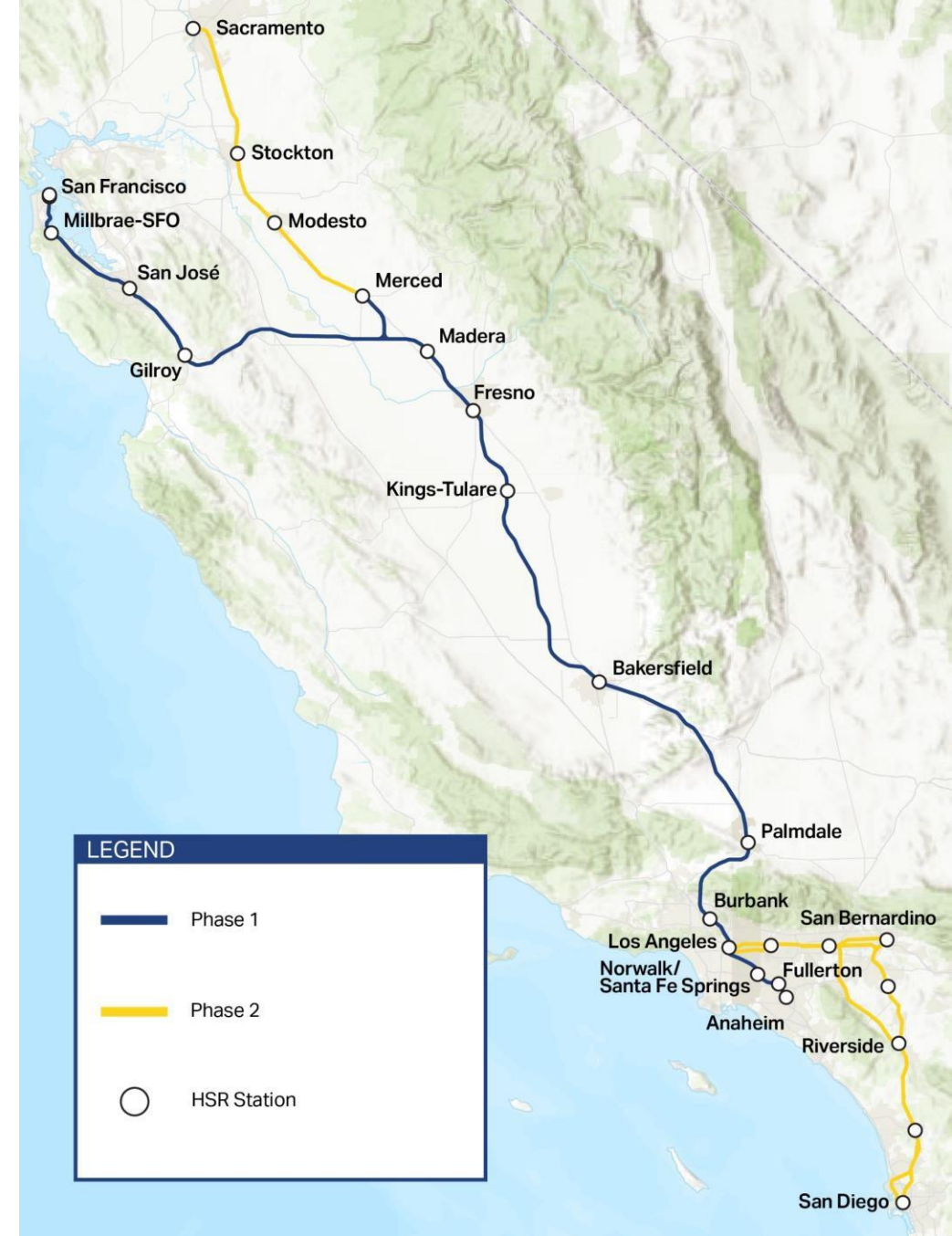
April 30, 2024

# Connecting California

## Program Highlights

- **Phase 1**
  - 494 Miles
  - San Francisco to Los Angeles/Anaheim
- **Phase 2**
  - After Phase 1 - Extends 300 Miles
  - Connections to Sacramento and San Diego

**Travels at approximately 220 mph**  
**Up to 24 stations**



# Where We Are Today

## 2024 Progress

- Today:

- 119 Miles Under Construction
- 52 miles Under Advanced Design (north 34 miles into Merced and 18 miles south into Bakersfield)
- Environmentally Clearing Full 494 Miles Between San Francisco and Los Angeles Basin
  - Approximately 422 Miles Environmentally Cleared To-Date
  - Anticipating 463 Miles Environmentally Cleared in 2024
- Statewide Bookend Projects
- Station Design for four Central Valley Stations
  - Merced, Fresno, Kings/Tulare and Bakersfield





# Central Valley Construction



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# Central Valley Early Operating Segment 171 Miles

- Status
  - » 100% environmentally cleared
  - » 119 miles under construction
  - » 52 miles starting advanced design (pre-construction work)
  - » 30% station design for Merced, Fresno, Kings/Tulare and Bakersfield
- Goals
  - » Initial operations by 2030-2033
  - » Track and Systems contract by 2024
  - » Train procurement by 2024





# Bay Area Valley to Valley Segment 159 Miles

- Status
  - » 100% environmentally cleared
  - » Eligible to begin advanced design
  - » Corridor electrification underway on 51 miles through Caltrain electrification projects
  - » Segment construction unfunded
- Goals
  - » Advance design work in 2024
  - » Continue to engage with partners on “shared corridor” early capital investments
  - » Develop segment funding plan options



# Southern California Complete Phase 1 164 Miles

- Status

- » Continuing Environmental Clearance in 2024
- » Eligible to begin advanced design where environmentally cleared
- » Bookend projects advancing
  - Rosecrans/Marquardt Grade Separation (anticipated completion in 2025)
  - LinkUS Project
- » Segment construction unfunded

- Goals

- » Complete environmental review
- » Identify “shared corridor” early capital investments
- » Develop segment funding plan options
- » Establish connection point with emerging Brightline service





# Program Update

## Highlights

- **13,000+ Construction Jobs Created Since Construction Began**
  - In 2023, Record Number of Workers Dispatched Daily (1,600+)
  - 25 Active Construction Sites in the Central Valley
  - Average 70% Workers from Disadvantaged Communities
- **840 Small Businesses Employed**
  - 291 are Disadvantaged Business Enterprises
  - 103 Disabled Veteran Business Enterprises
  - Wealth Creation for Residents of Disadvantaged Communities
- **Leading In Sustainability**
  - Currently Using Tier IV Equipment on Construction
  - Will Run on 100% Renewable Energy
  - Recognized as a Platinum Sustainable Infrastructure Project





# Central Valley Stations



# Grants Received from Infrastructure, Investment and Jobs Act (IIJA) - Over \$3.3 Billion

- **\$24 Million** | 2021 Rebuilding American Infrastructure with Sustainability and Equity (RAISE)
  - » Wasco SR 46 Grade Separation Improvement Project
- **\$25 Million** | 2022 RAISE
  - » Design Advancement to Merced
- **\$20 Million** | 2023 RAISE
  - » Fresno Station Historic Depot Renovation and Plaza Activation Project
- **\$202 Million** | 2023 Consolidated Rail Infrastructure and Safety Improvements (CRISI)
  - » Grade Separations in the City of Shafter
- **\$3.1 Billion** | 2023 Federal-State Partnership for Intercity Passenger Rail
  - » Inaugural Central Valley High-Speed Rail Service
- **\$500 Thousand** | 2023 Corridor Identification and Development Program
  - » Federal List of Pipeline Projects



# Procuring the Trainsets

- Request for Qualifications issued August 2023
- Short List of Qualified Bidders Released January 2024
- Request for Proposals Released April 2024
  - Six trainsets capable of operating at 220 mph and tested up to 242 mph;
  - Two prototypes in 2028 to support static/dynamic testing and trial running;
  - Additional four trainsets by the end of 2030 to support revenue operations on the 171- mile Merced to Bakersfield section.



# Upcoming Procurements

- **Procurement Packaging**
  - Anticipated Fall 2024:
    - Progressive Design-Build Traction Power System
    - Progressive Design-Build Rail Train Control and Communications System
  - Anticipated Winter 2024/2025:
    - CM/GC Construction of Track and OCS
  - Draft documents will be available for industry review prior to advertisement of these procurements
  - Additional contracts, including Independent Cost Estimator, Integration Support, Facilities Design, Construction Management for the track and systems contracts, construction of civil infrastructure for Merced and Bakersfield extension project sections, and Construction Management, will be issued as those services are needed
- Additional information available at the May 7, 2024, HSR Small Business Fast-Track Networking Fair & Industry Update



# Upcoming Procurement Event

**Networking Fair and Industry Update**

**May 7, 2024**

**9:00 a.m. to 4:00 p.m.**

**DGS Ziggurat**

**707 3<sup>rd</sup> Street**

**West Sacramento, CA 95650**

- Event will provide small businesses an opportunity to connect with HSR prime contractors and consultants, and learn about contracting and procurement opportunities in California
- Contracting opportunities and procurement updates to be discussed include:
  - » Upcoming RFP and RFQ schedule
  - » Track and Systems
  - » Merced and Bakersfield extensions
  - » Station and facility design update
  - » Design and construction of traction power system, including solar and battery energy storage systems

# High-speed train electrification

- » Traction power utility connections every 30miles
- » Each train can draw 8-9MW, the same as approx. 5500 houses
- » Trains regenerate when braking, from 220mph to 0mph
  - This can reduce energy use by 8-17%



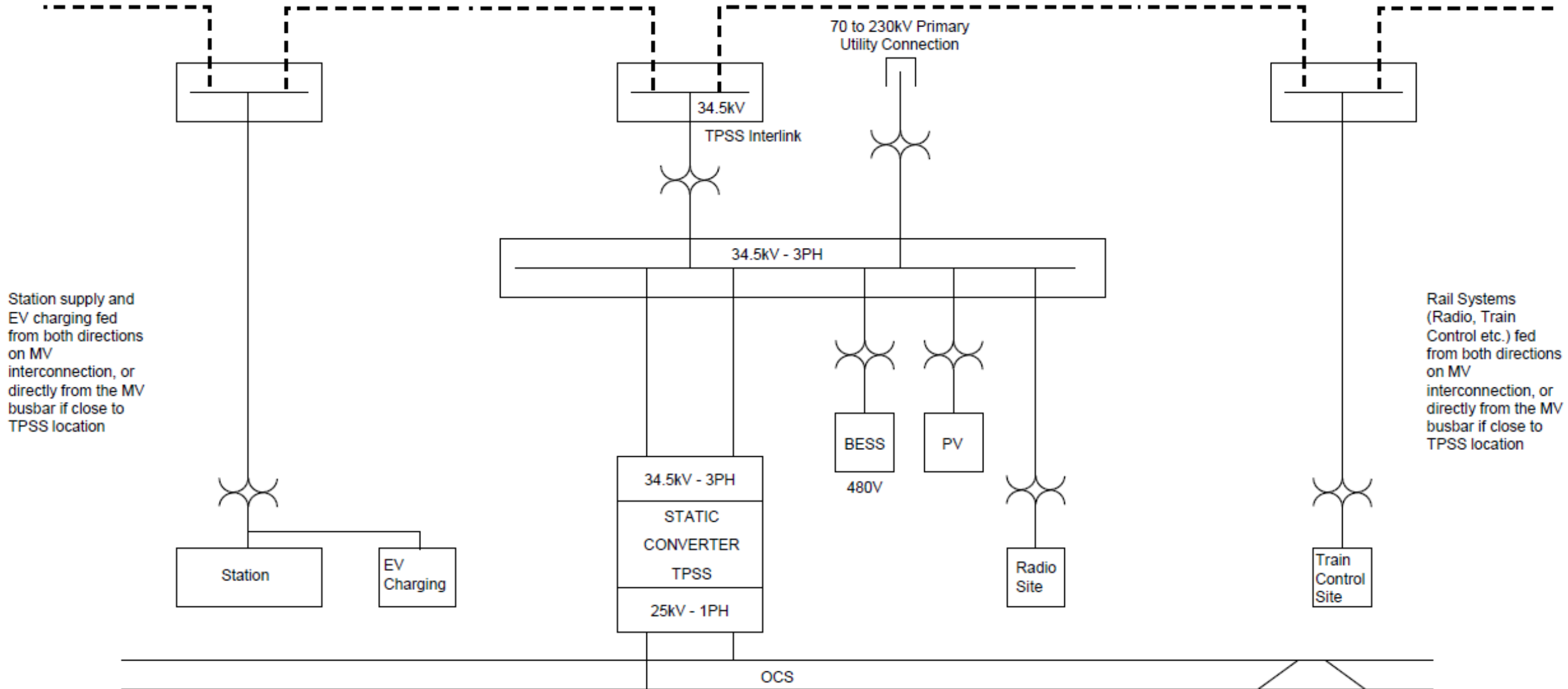


# Utility Connections / TPSS

- Traction Power Substations (TPSS) locations approximately every 30 miles.
- TPSS are strategically located along the alignment to ensure even power delivery to trainsets.
- TPSS locations traditionally connect to Utilities and supply the Overhead Catenary System, but on the High-Speed Rail system they also connect to the Solar and Battery Energy Storage System
- Solar provision provides several benefits to the infrastructure:
  - » Removes the need for 2 utilities connections, reducing capex expenditure.
  - » Adds unprecedented resilience to the infrastructure from black/brown outs.
  - » Drastically reduces our reliance on utility derived power, assisting them with capacity issues.



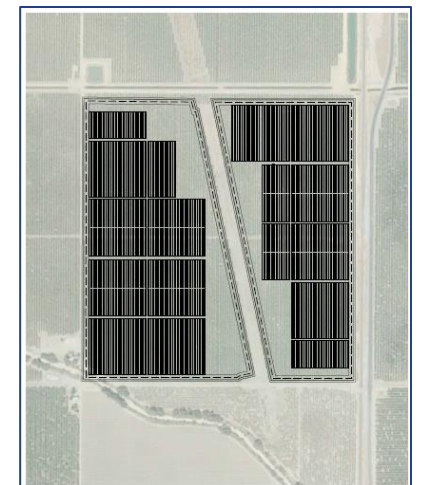
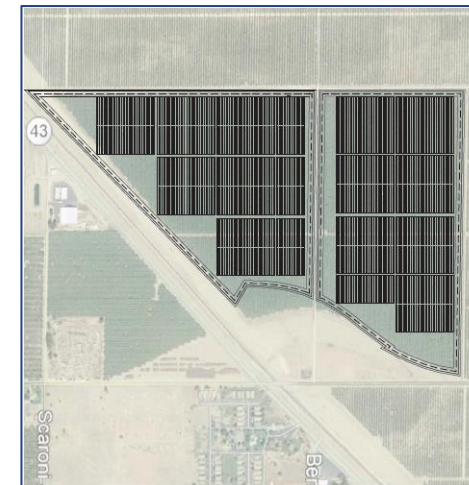
# Power System Block Diagram



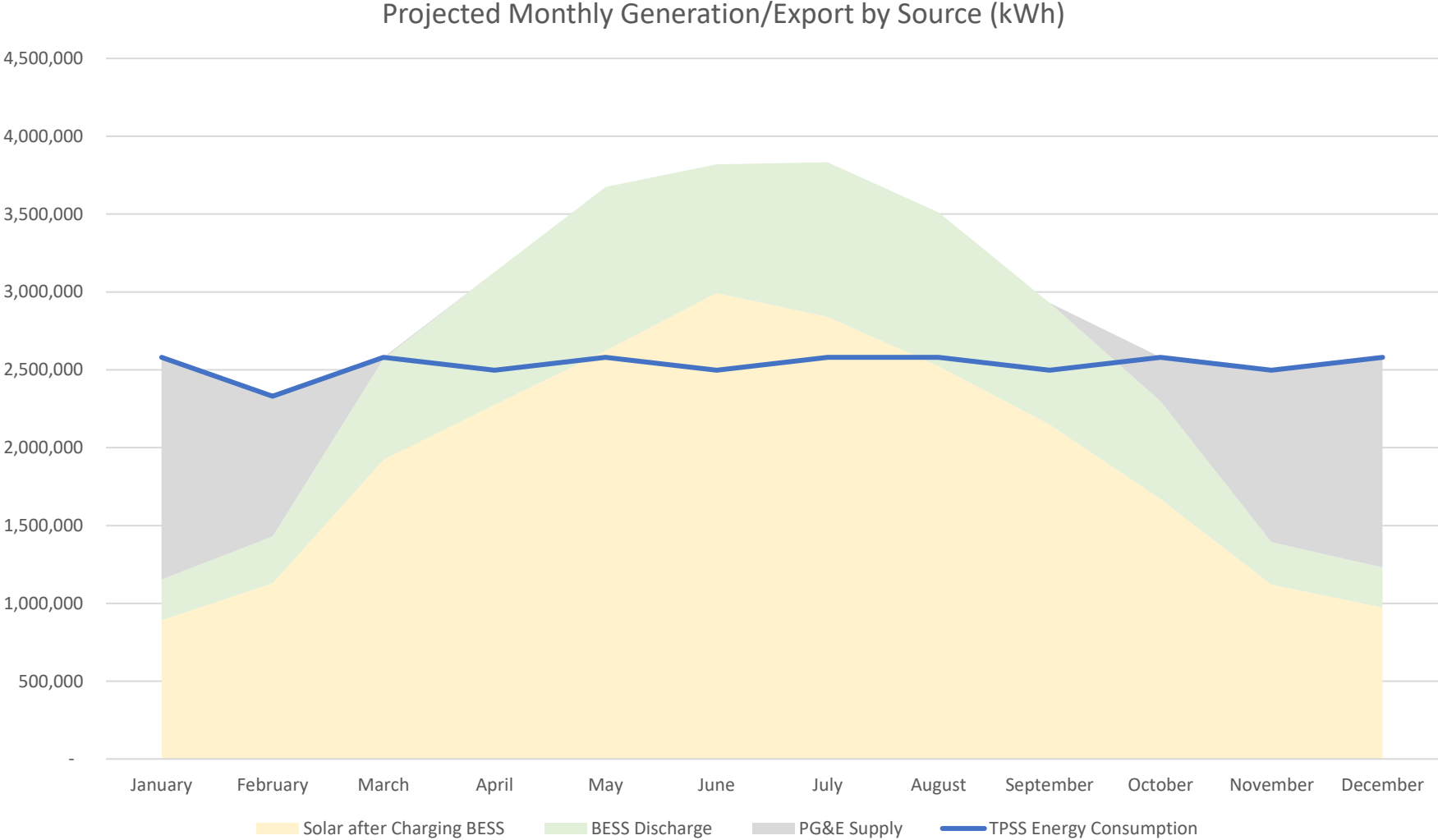


# How do we supply that energy - TPSS 12 example

- **Location:** Wasco, CA
- **HSR Owned Acres:** 144
- **CV Solar PV:** 14.9 MW



# Typical TPSS Monthly Energy Behavior





# System CAPEX / OPEX Costing

Site	Projected Consumption (GWh)	Solar PV Size (MW-DC)	2022 Assumed System Cost (Including utility Upgrades)	2022 Pre-Project Utility Bill (June 2022 B-20 T)	2022 Post-Project Utility Bill (June 2022 B-20 T, NEM 3.0 2023 Exports)	2022 Assumed Annual O&M Cost	Avoided Operational Cost (saving)
TPSS 7	15	5	\$27m	\$3m	\$0.6m	\$100k	\$2.3m
TPSS 9	30	16	\$60m	\$5m	\$1.0m	\$220k	\$3.8m
TPSS 10	15	8	\$32m	\$4m	\$0.7m	\$170k	\$3.1m
TPSS 12	30	15	\$53m	\$6m	\$1.0m	\$210k	\$4.8m
	<b>90</b>	<b>44</b>	<b>\$172m</b>	<b>\$18m</b>	<b>\$3.3m</b>	<b>\$700k</b>	<b>\$14m</b>

# Key Considerations for Renewable Energy Supply Planning



## Reliability & Resilience

Behind-the-meter renewables supply and batteries support reliable train operations during extreme events

## Interconnection

Renewable energy with batteries can benefit the capacity and supply of the utility system

## Affordability

Existing incentives and compensation mechanisms leveraged to reduce energy supply costs

## Site Control & Parcel Sizing

Characteristics of owned parcels inform choice for those best suited to host solar resources

## Procurement

Focus on technical interfaces and timing



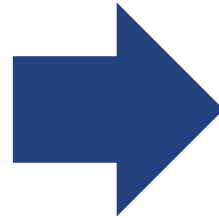
# Summary

## Technical Strategy & Analysis

**Optimize renewable** grid interconnection configuration and tariffs

**Control dispatch of renewable energy** assets at TPSS locations, prioritizing train operations

Scale storage for **peak shaving and resilient backup power**



## Benefits

**Reduce annual operating costs** and maximize savings

Maintain business operations through **resilient power supply**

Provide **grid benefits** by reducing intermittency, load, and peak energy demand

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