CALIFORNIA
High-Speed Rail Authority

# Resilient and Renewable Power for California High-Speed Rail

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# The Board focused on a renewable power supply for the high-speed rail system more than 15 years ago.

- **Policy**: The Authority will deliver a sustainable high-speed rail system for California that ***serves as a model for sustainable rail infrastructure.*** *POLI-1007*
- **Commitment**: In 2008, the Board committed to a policy goal of running the system entirely on renewable energy.
- **Focus**: For the past decade, the Board has maintained that commitment.

*The Board has established a long-standing track record reinforcing the Authority's commitment to clean energy and sustainable rail infrastructure*

# Timeline of Renewable Energy Strategy Work

Exploration of strategy options to achieve 100% renewable goal
**2010**

**2012**
Strategic Energy Plan validated goal and confirmed approach feasibility

Agency and industry engagement & conducted load modeling and financial analysis
**2013 – 2016**

**2018 – 2019**
Initial behind the meter strategy analysis to explore basic feasibility with cross-functional teams

Investigated Authority parcel feasibility along the Central Valley setgment as well as reliability requirements for operations with cross-functional teams
**2019 – 2022**

**Present Day**
Continuing work refining power load modeling, financial optimization, and exploring procurement options with cross-functional working group

# Technical and policy considerations are the foundation for a renewable power supply behind-the-meter.

Renewable power supply strategy is informed by:

1. **Preliminary energy demand modeling**
2. **Authority-owned land**
3. **Grid interconnection strategies**
4. **Resilience and reliability planning**
5. **Commitment to 100% clean energy**
6. **Reducing operating costs**

***Focus of today's discussion***

**Renewable Resources Behind-the-Meter:** Solar, storage, and additional renewable resources will be connected via TPSS to support renewable policy goals and resilient train operations.

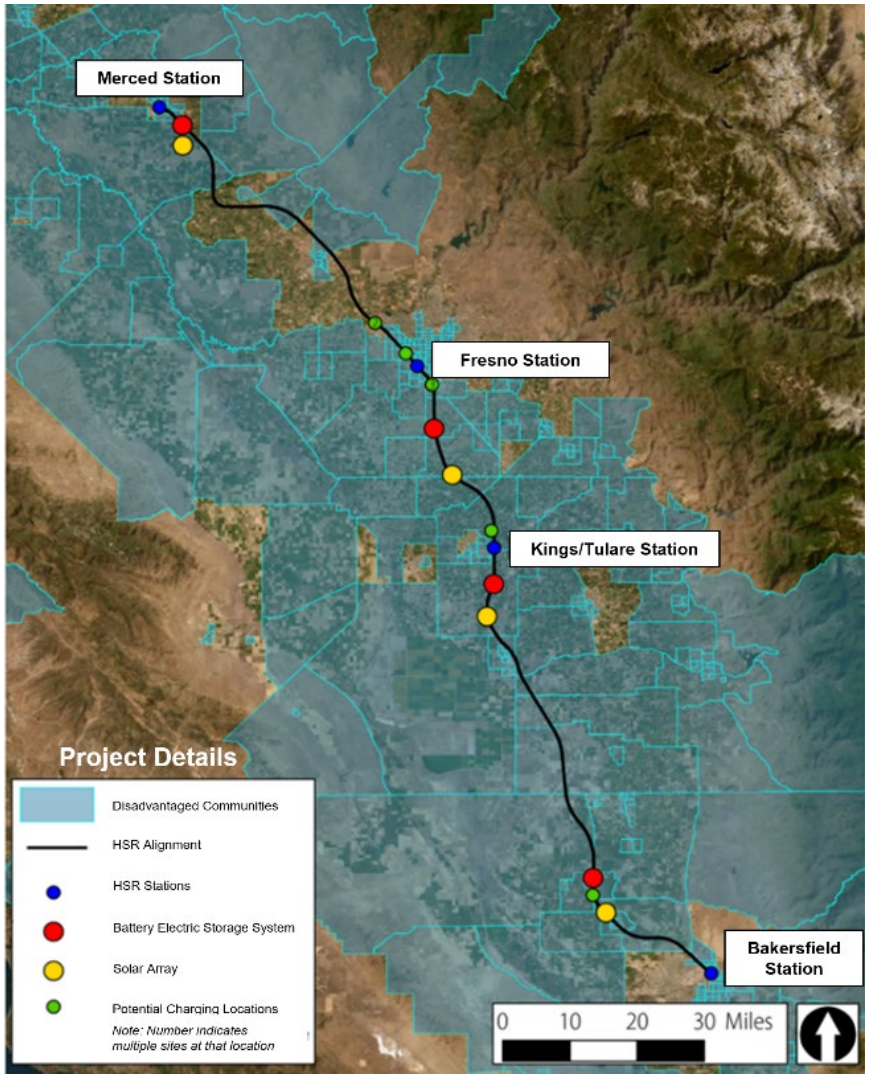
# Key Considerations for Renewable Energy Supply Planning

| Reliability & Resilience | Interconnection | Affordability | Site Control & Parcel Sizing | Procurement |
|---|---|---|---|---|
| Behind-the-meter renewables supply and batteries support reliable train operations during extreme events | Renewable energy with batteries can benefit the capacity and supply of the utility system | Existing incentives and compensation mechanisms leveraged to reduce energy supply costs | Characteristics of Authority-owned parcels inform choice for those best suited to host behind-the-meter solar resources | Focus on technical interfaces and timing |

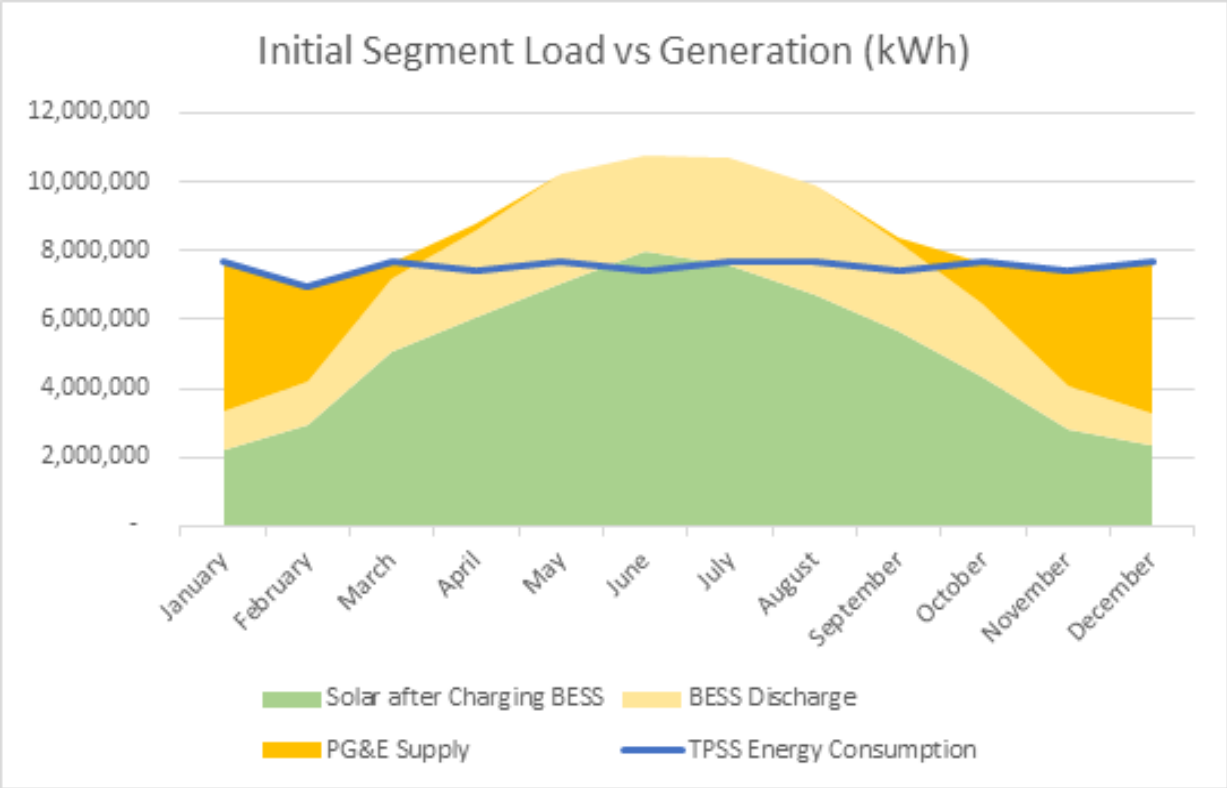
# A behind-the-meter strategy localizes solar and storage at the traction power substations.

Renewable power supply strategy is informed by:

1. **Existing traction power substation locations**
2. **Preliminary energy demand modeling based on the Merced to Bakersfield operations**
3. **Authority-owned land suitably sized for solar generation**
4. **Grid interconnection design**
5. **Resilience and reliability requirements**
6. **Commitment to 100% clean energy**



# Illustration of modelled load and generation for the Merced-Bakersfield segment.



# The renewable energy supply has been optimized for reliable operations and benefits.

## 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

# Stakeholder engagement has focused on the interconnections and logical renewable energy sourcing.

## California Independent System Operator (CAISO)

- Requires renewable energy designs to meet transparency and telemetry requirements
- Briefed on project load and profile May 2022

## Pacific Gas and Electric (PG&E)

- Collaborated with CHSR on interconnection since 2014
- Reviewed recent updated load profile

## California Energy Commission (CEC)

- Periodic meetings on renewable energy goals
- Provides insight on renewable energy market and state grants

## California Public Utilities Commission (CPUC)

- Oversees electricity tariffs
- Meets periodically to review Authority strategy and progress

# Next Steps: Focus on Refining Analyses and Procurement Options

**There are several levels of analysis and decisions ahead.**

- **Energy Model**: Streamline the model to more dynamically accommodate changes and inform decision making

- **Procurement Method**: Identify logical procurement method as well as ensure efficient, cost-effective, and sustainable procurement according to the Authority's ESG objectives.

- **Funding**: Seek capital funding via grants to help reduce costs and expand operational capacity.

  For example, the Authority submitted a DOE Grid Resilience and Innovation Program (GRIP) grant in May of 2023 requesting $52.5 million for solar and battery resources.

# Next steps for analysis and staff work include continued cross-functional work.

The near-term stages of analysis will focus on the following components:

1. **Update and adjust the strategy with new information on Phase 1 alignment**
2. **Understand the opportunity and evaluate how the net-energy positive passenger stations as well as zero emission vehicle (ZEV) energy needs are best integrated**
3. **Optimize renewable energy power on a more granular, including hourly, basis**
4. **Investigate additional revenue stream value opportunities**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Questions?


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