



SUNSPEC  
— ALLIANCE —

**Clean**  **Coalition**

WEBINAR

# Building the Distribution Grid of the Future:

DSO Policy, Open Markets,  
DERMS, and Interoperability



September 30, 2026

10:00 am PST

INTEROPERABLE TECHNOLOGIES.  
A MORE RESILIENT GRID.



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# FEATURED SPEAKERS

## Building the Distribution Grid of the Future

DSO Policy, Open Markets, DERMS & Interoperability • September 30, 2026



**Dylan Tansy**

Executive Director

SunSpec Alliance



**Ben Schwartz**

Policy Director

Clean Coalition



**Chris Cook**

Director of Energy  
Programs

Central Coast Community  
Energy



**Jared Satrom**

Director of Energy  
Markets – CAISO

Voltus



**Jay Johnson**

Chief Technology Officer

DER Security Corp





**Grid Optimization by Leveraging DER (GOLD):**  
**Implementing a Truly “Local-First” Distribution System Operator**

Ben Schwartz  
Policy Director  
626-232-7573 mobile  
[ben@clean-coalition.org](mailto:ben@clean-coalition.org)

## **Mission**

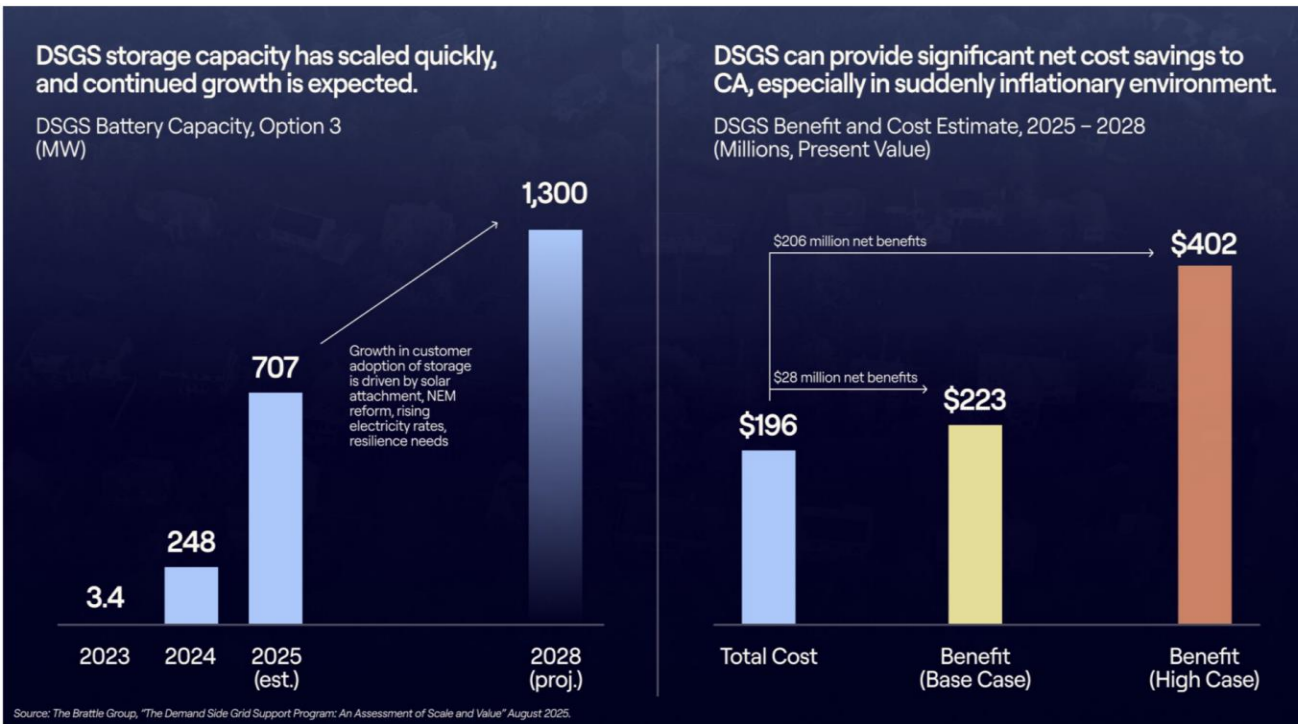
To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

## **Renewable Energy End-Game**

100% renewable energy; 25% local, interconnected within the distribution grid and ensuring resilience without dependence on the transmission grid; and 75% remote, fully dependent on the transmission grid for serving loads.

# A Well-Implemented Distribution System Operator is an Affordability Solution

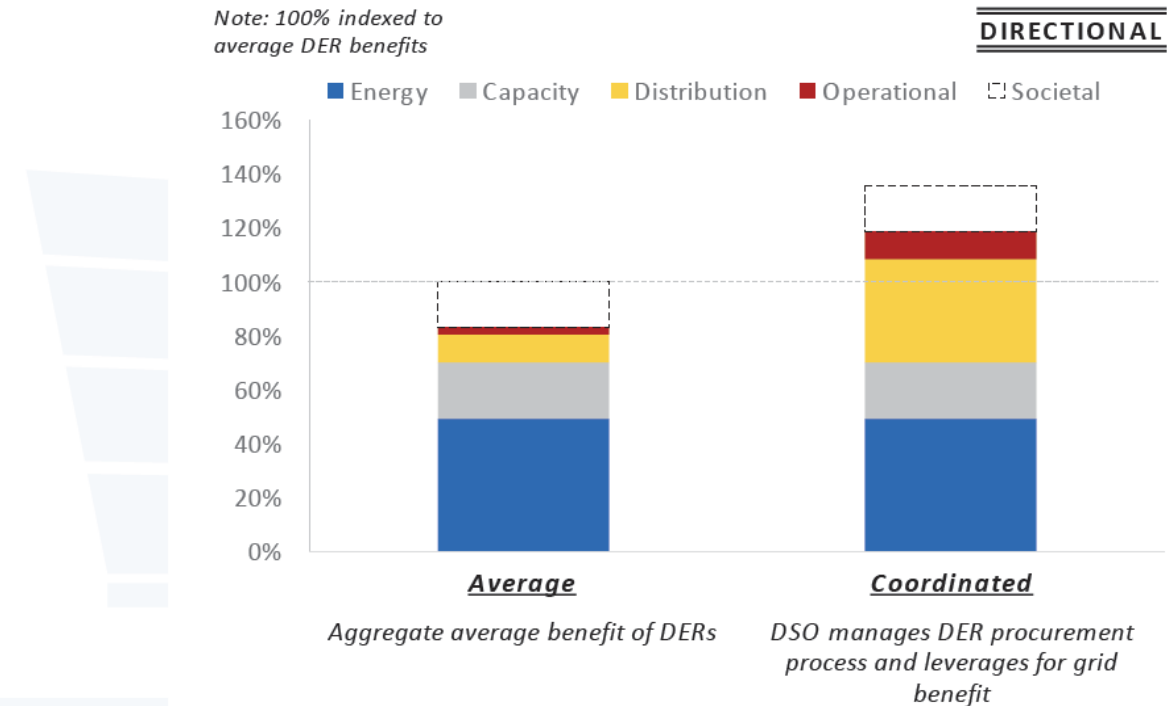
*A distribution system operator (DSO) capable of optimizing the grid for DER participation and orchestrating aggregated DER can create significant ratepayer savings by improving grid utilization, avoiding costly infrastructure upgrades, and increasing the pace of electrification.*



**DSGS has rapidly scaled distributed battery capacity, demonstrating clear ratepayer benefits.** Source: Brattle Group, The DSGS Program: An Assessment of Scale and Value, August 2025

**Figure 5: Impact of DSO coordination of DERs on benefits to grid**

Note: 100% indexed to average DER benefits



## Grid Optimization by Leveraging Distributed Energy Resources (GOLD)

- A framework to strategically deploy and orchestrate solar, storage, EVs, flexible loads, smart inverters, and other DER.
- Implementing GOLD means “local-first” planning that makes better use of existing infrastructure, enables efficient grid operation, & supports growing electricity demand.
- GOLD provides value across three fundamental dimensions: **balancing the grid, speed-to-power, and resilience.**

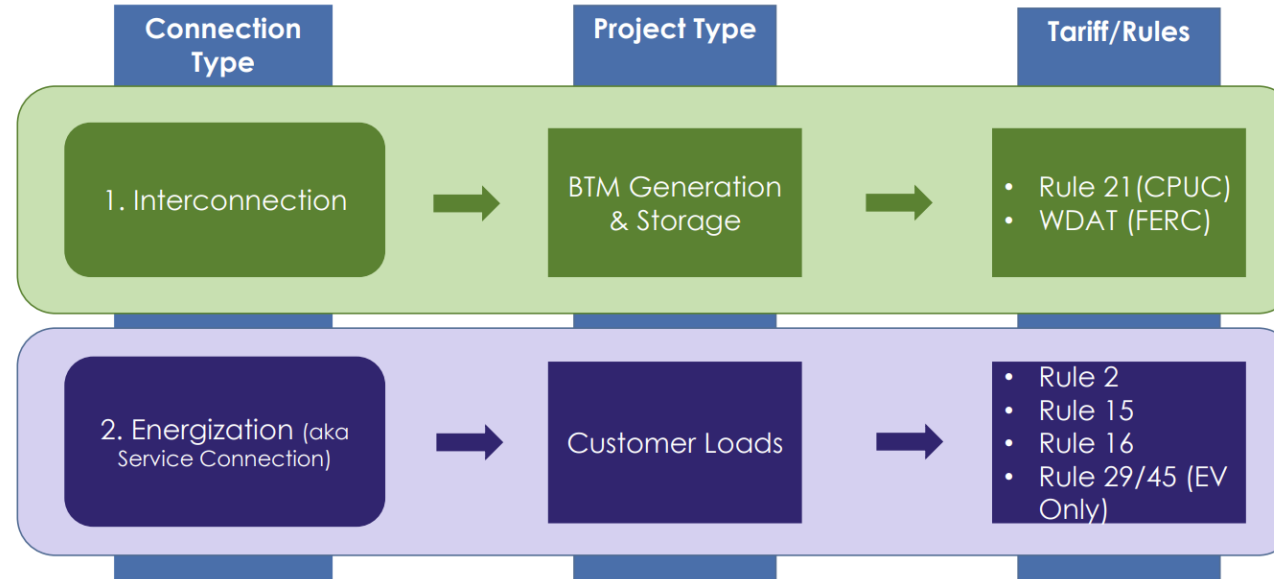
### 1. Balancing the Grid (three dimensions)

| Service             | Key to Delivering Service                          |
|---------------------|----------------------------------------------------|
| Energy Balancing    | <u>Capacity</u> of real power (W)                  |
| Voltage Balancing   | <u>Location</u> of reactive power (VAr)            |
| Frequency Balancing | <u>Speed</u> of sourcing or sinking real power (W) |

**The Duck Curve only addresses Energy Balancing, but Inverter-Based DER can provide unparalleled balancing of all three dimensions.**

## 2. Speed-to-Power (and Maximizing Grid Utilization)

**An effective DSO should enable timely energizations and interconnections**



- Flexible loads/generation connection options (PG&E's FlexConnect Program)
- A market structure with transparent opportunities and value streams for DER
- A 'prime directive' to maximize use of existing infrastructure through non-wires alternatives to ensure all upgrades are right sized.

*The DSO's compensation should incentivize speedy interconnection, timely energization, efficient DER operation, and avoided infrastructure costs.*

### 3. Resilience and Microgrids

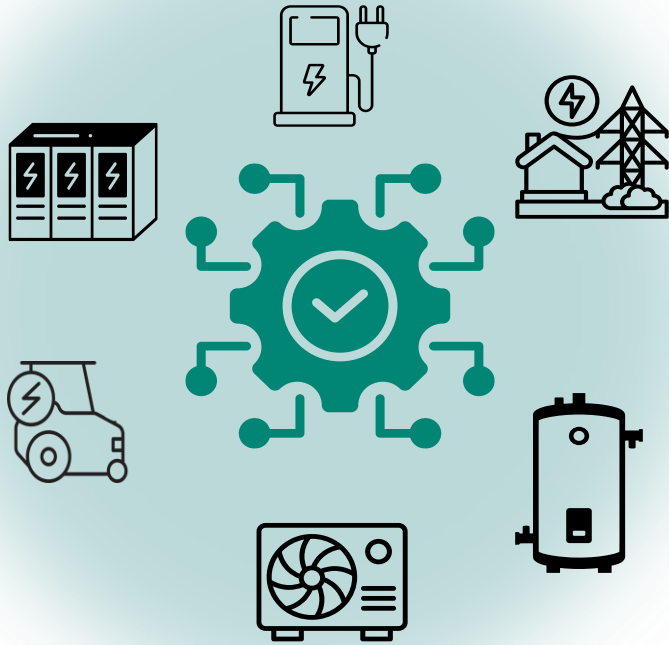
- The DSO should be allowed to identify areas where aggregating DER for a future Community Microgrid deployment creates measurable local reliability and resilience value.
  - This could include substations, critical feeders, end-of-feeder locations, or critical facilities.
  - The CPUC has previously approved Substation-level Microgrids, including the Calistoga Substation Microgrid project.
- Valuing resilience benefits of DER even in advance of a Community Microgrid deployment can incentivize additional DER installations designed to support community resilience.
  - Example: Grid forming and black start capabilities required for a Community Microgrid can be project cost drivers.
  - A clear price signal to incentivize resilience could increase DER deployments capable of supporting Community Microgrids.

## Eight Core DSO Components

|                                      |                                 |                                                       |                                            |
|--------------------------------------|---------------------------------|-------------------------------------------------------|--------------------------------------------|
| <b>Open Markets<br/>&amp; Access</b> | <b>Neutral<br/>Governance</b>   | <b>Interoperability &amp;<br/>Communications</b>      | <b>Decision-Grade<br/>Data</b>             |
| <b>Value &amp;<br/>Compensation</b>  | <b>M&amp;V /<br/>Settlement</b> | <b>Integrated Planning<br/>&amp; T-D Coordination</b> | <b>Incentives &amp;<br/>Accountability</b> |

*A DSO is more than DERMS—it is the planning, market, data, communications, valuation, and governance architecture that turns local DER capabilities into bankable grid services and verifiable ratepayer savings.*

# Virtual Power Plant Program Battery Pilot Development



**September 30, 2026**

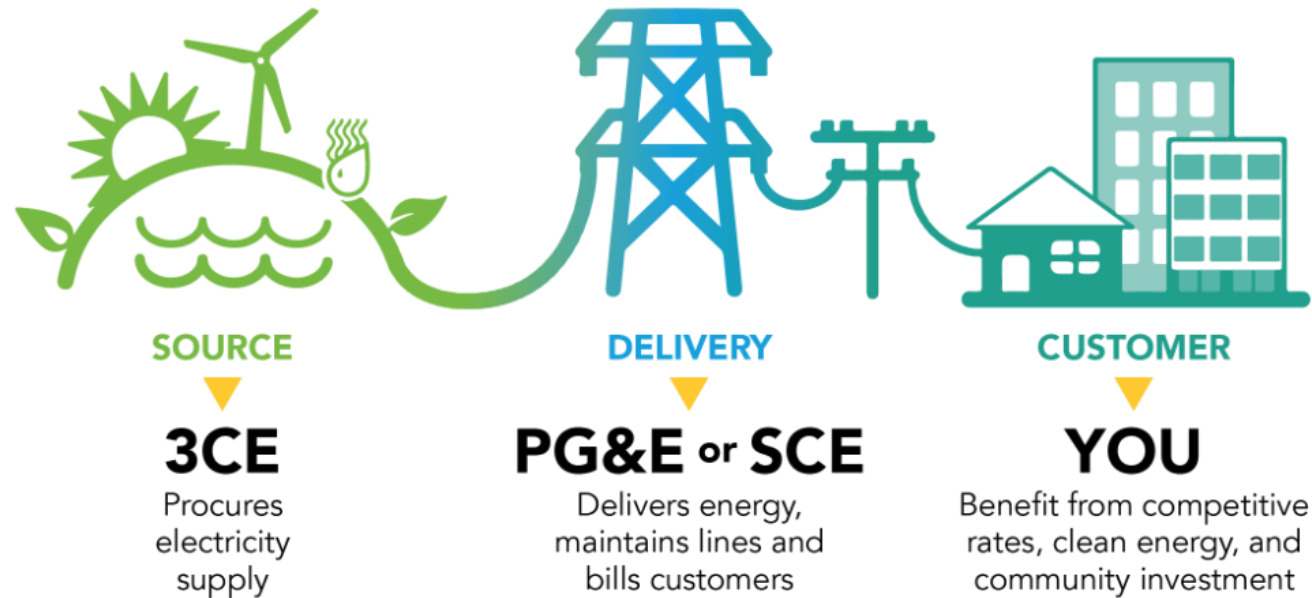
**Christopher Cook, PE**  
**Director of Energy Programs**



Central Coast  
**Community  
Energy**

# Who is 3CE?

A local public agency — we source your electricity and the utility delivers it.



# 3CE's Energy Programs Portfolio

**Transportation  
Electrification**



**Building  
Electrification**



**Agricultural  
Electrification**

# 3CE's Energy Programs Portfolio

**Transportation  
Electrification**



**Building  
Electrification**



**Agricultural  
Electrification**



**Energy  
Optimization**

**Hourly Flex Pricing  
Pilot**

**Virtual Power Plant**

# Goals

Leverage Latest Technology to:

Improve Grid Reliability

Empower Customers

Further Clean + Renewable Energy Goals

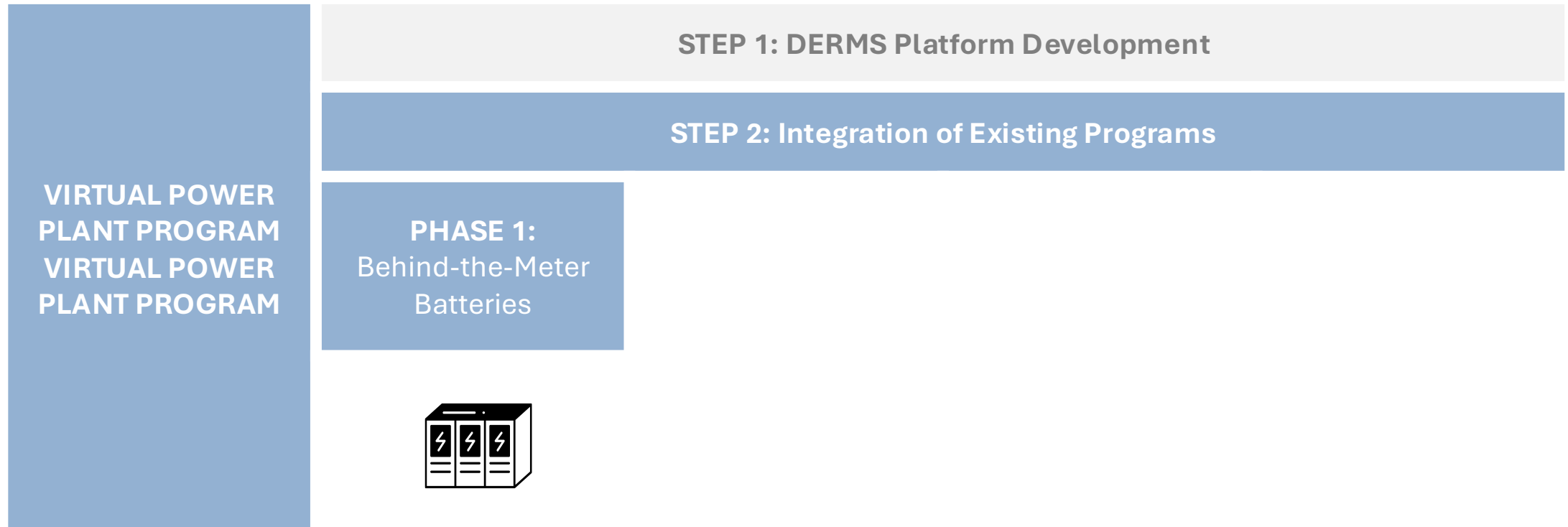


# VPP Phases

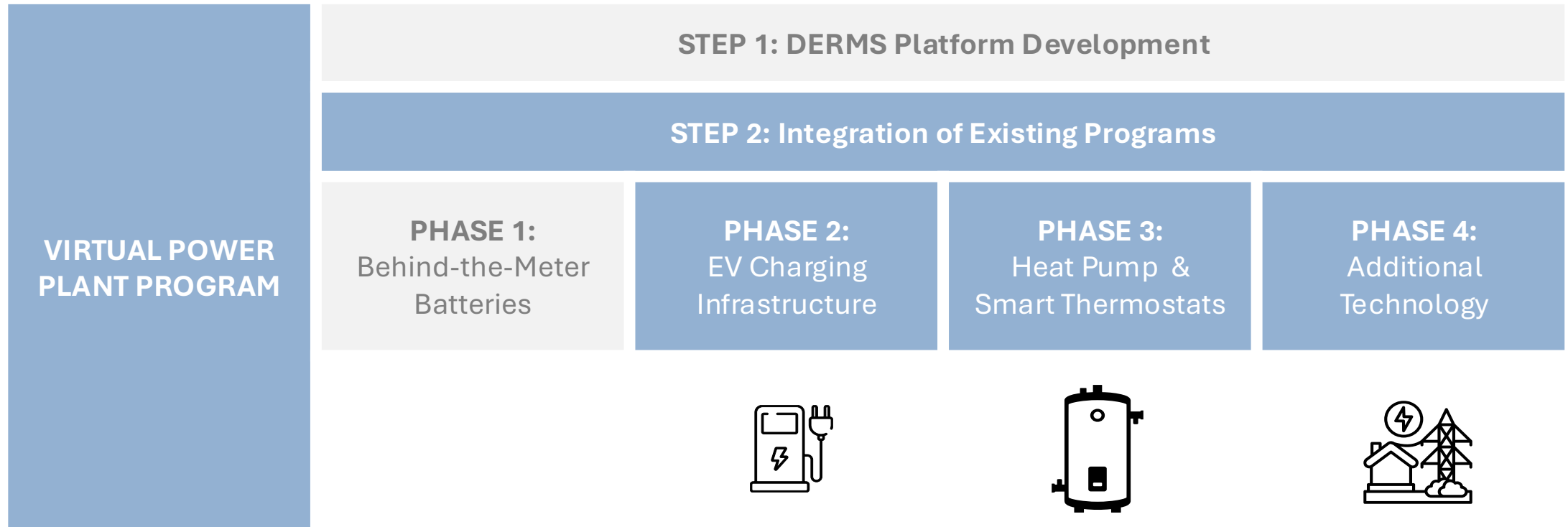
VIRTUAL POWER  
PLANT PROGRAM

STEP 1: DERMS Platform Development

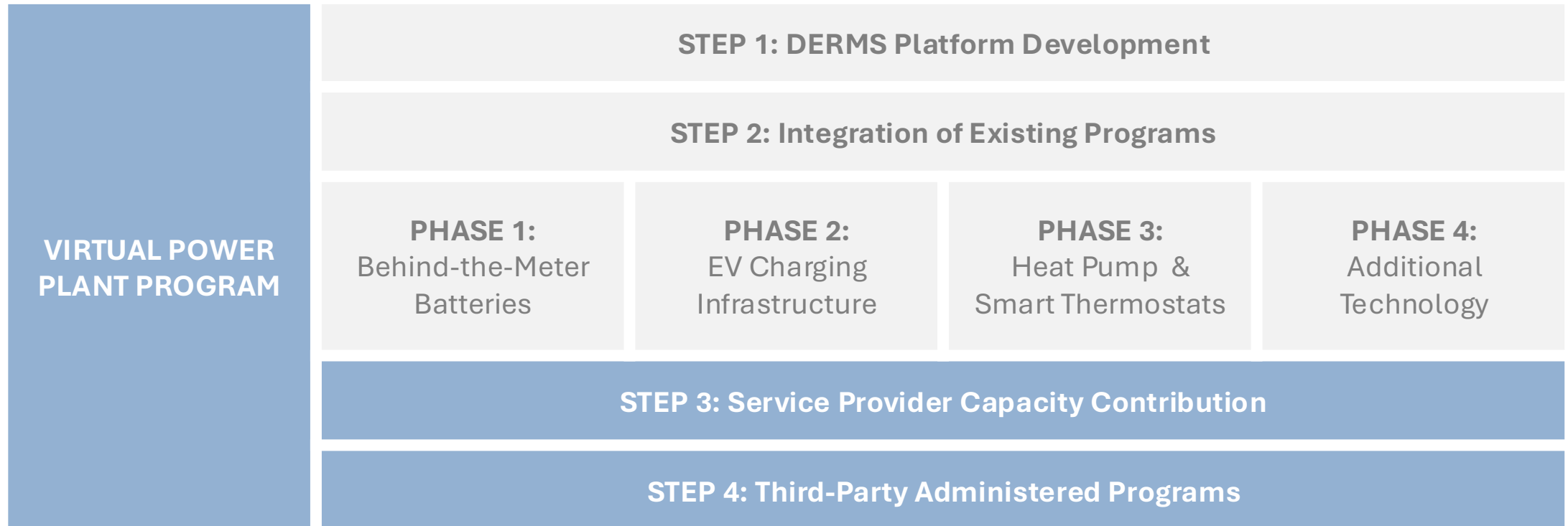
# VPP Phases



# VPP Phases



# VPP Phases



# How the Battery Pilot Works

## Customer Flow



### ENROLL

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- ✓ Application on 3CE's website
- ✓ Connect device to Gridshare

### EVENTS

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- ✓ 3CE identifies grid need, calls event
- ✓ 2-4 hours
- ✓ DERMS vendor dispatches connected systems

### INCENTIVES

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- ✓ Upfront incentive check
- ✓ Ongoing accrual of performance incentives – paid annually on bill

# Communication Preferences



## How is a customer notified?

Receive email before event call



## Where can they learn more?

See event status in manufacturer app and 3CE website



## How to opt out?

They can opt out of an event by giving notice to 3CE

# VPP Benefits

| 3CE                                   | CUSTOMER                                |
|---------------------------------------|-----------------------------------------|
| Energy, RA, and REC Cost Avoidance    | Pay for Performance Incentives          |
| Support Technical Customer Assistance | Energy Arbitrage Savings                |
| Ability to Scale Economic Impact      | Support Multiple Customer Types         |
| GHG Emissions Reduction               | Whole Home Electrification Optimization |



# Thank You

STAY CONNECTED

Questions: Christopher Cook · [programs@3ce.org](mailto:programs@3ce.org)

*[3CEnergy.org](http://3CEnergy.org)*

# Distribution Adequacy

A market-based framework to price and dispatch flexibility on the distribution grid



09/30/2026

# Solving The Missing Money Problem

Distribution-level flexibility has no price signal — Distribution Adequacy gives it one, using the same playbook as Resource Adequacy



Resource Adequacy already pays flexible resources a **capacity payment** for meeting a system-level Must-Offer Obligation and being economically dispatched by CAISO.



Nothing today pays a resource for showing up specifically **where** the distribution grid needs it — that’s the “missing money” for locational, distribution-level flexibility.



Distribution Adequacy applies the **same RA playbook one level down**: developers earn an additional distribution capacity incentive for deploying BTM DERs where CAISO’s price signal shows local need.



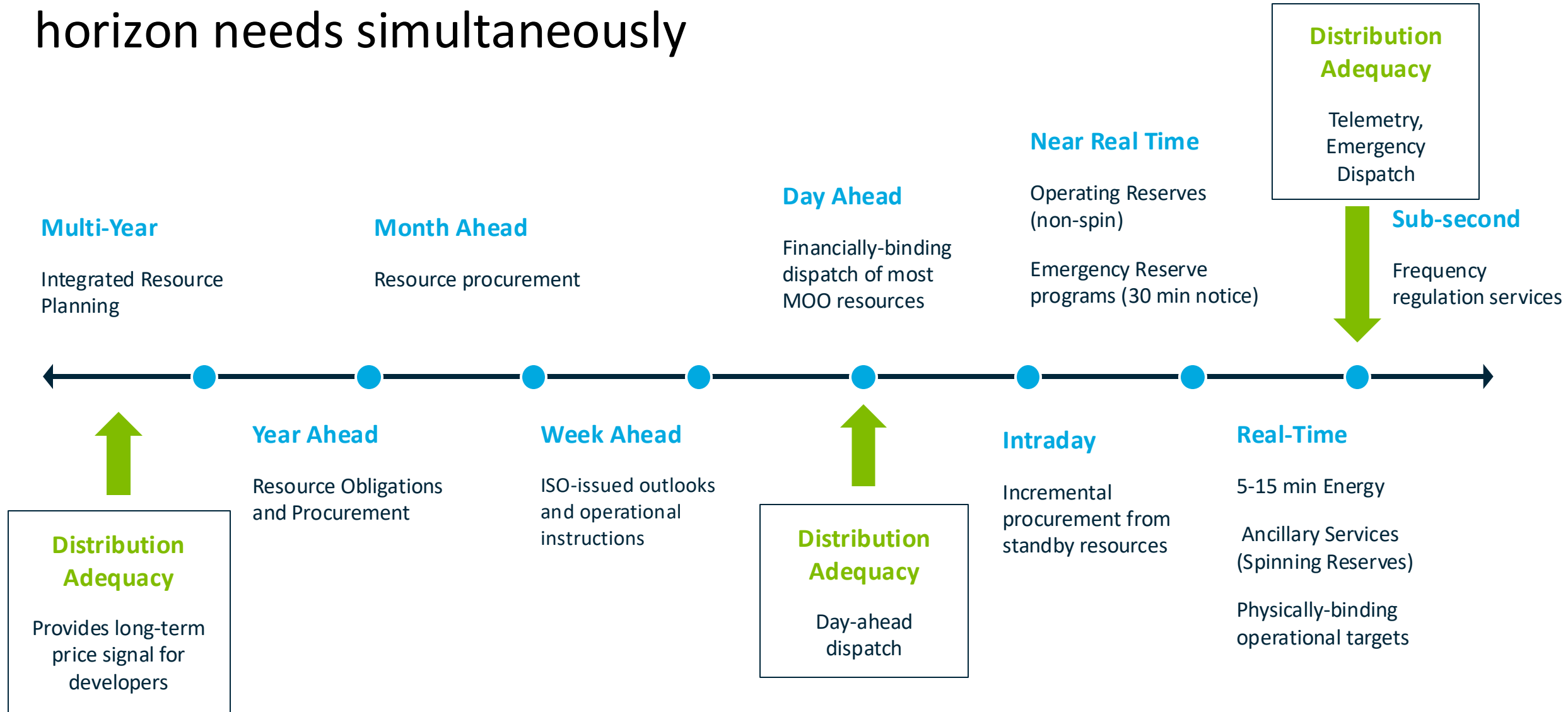
The resource is still **economically dispatched** by CAISO according to price — just with one more locational layer added to the signal.

# How It Works

One price signal, one dispatch, two key roles for system operators

|                            |                                                                                     | CAISO — Program Administrator                                                                                 | DSO — Signal Provider                                                                        |
|----------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Price signal               |    | Combines wholesale LMP + a local $\Delta$ Dist into one Distribution Adequacy price                           | Calculates $\Delta$ Dist from feeder/circuit-level congestion and sends it upstream to CAISO |
| Dispatch                   |    | Runs economic dispatch against the combined price — the same mechanism used for LMP today                     | May issue voluntary dispatches for emergencies (no penalties)                                |
| System modeling            |    | Consumes the DSO's signal; does not run its own distribution-system model                                     | Runs the distribution-system model needed to compute local scarcity                          |
| Accreditation & settlement |   | Administers the Must-Offer Obligation and pays the Distribution Adequacy capacity credit, alongside System RA | No responsibilities                                                                          |
| Operations and Telemetry   |  | Consumes DSO's telemetry. No direct control.                                                                  | No direct control over enrolled resources, but obtains telemetry, transmits to CAISO         |

# Distribution Adequacy meets planning horizon and operational horizon needs simultaneously



# Distributed Adequacy Recap: valuing local flexibility

## A distribution-level analog to resource adequacy

### TODAY

Distribution flexibility goes unpriced

### THE CONCEPT

A capacity payment, like RA, but more granular

*Distribution & system capacity should co-optimize, like ancillary services do today*

## How it could work

- Price backbone: DLMP = wholesale LMP + a local congestion adder
- Must-offer obligation triggers when local DLMP crosses a threshold
- Capacity credit set by local ELCC  $\times$  a seasonal performance test
- Settlement: capacity payment  $\times$  performance, plus energy at DLMP

### Status & why it matters

- An early-stage internal concept, not a filed proposal
- Real precedent: NY's Term/Auto-DLM, GB's Piclo-run DNO markets
- **Biggest open question:** IOUs standing up real price signals
- A stackable product to RA which could attract **more investment in DER's where they're needed most**

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SUNSPEC ALLIANCE + CLEAN COALITION WEBINAR

# From Standards to Gigawatt Integrations

Unlocking DER potential through interoperability and grid-support functions.

# DER to Grid Service

## CONVERTER FUNCTIONS

Volt-VAR,  
Volt-Watt,  
power factor

Freq-Watt,  
fast frequency  
response

Voltage and freq  
ride-through

Active power limit,  
ramp rate,  
schedules

IEEE 1547

## WHAT THE GRID GETS

Voltage held within  
ANSI C84.1

Frequency support  
without reserve

Ride-through instead  
of mass tripping

Headroom and  
congestion relief

Autonomous functions deliver sub-second services.

## GRID SERVICES



Energy  
Service



Reserve  
Service



Regulation  
Service

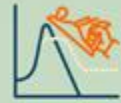


Voltage  
Management  
Service



Frequency  
Response  
Service

## GRID OPERATOR OBJECTIVES



Load Shaving/  
Load Shaping



T&D Voltage  
Support



Frequency  
Regulation



Emergency  
Power and  
Restoration



Contingency  
Reserves



Economic  
Energy  
Dispatch



Reliability &  
Resiliency

## GRID OPERATOR PROGRAMS AND MARKETS

### Distribution System



TOU Rates/  
Hourly Flex  
Pricing



Site  
Static  
Limits



Voltage  
Optimization  
& Var Mgmt



Dynamic  
Operating  
Envelopes



DR & DER  
Curtailment



Localized  
Congestion  
Relief

### Transmission System



Transmission  
Voltage  
Regulation



Primary  
Freq  
Resp



AGC  
Resp



Spinning &  
Non-spinning  
Reserves



Rapid  
Ramping  
Reserves



Economic  
Dispatch

## IEEE 2030.5 Functionality

### Function Sets

#### DER Functions



DER  
Status



DER  
Capability



DER  
Settings

#### Pricing

\$\$\$

#### Device Info



#### Metering



### Event Management

#### Scheduling and Primacy

- Priority levels
- Conflict resolution
- Update notifications
- Resource subscriptions
- Time bounded commands

### DER Programs

Grouping based on topology,  
geography, capacity, type, etc.

DER Control Modes (scheduled & default)  
Fixed P/Q, volt/var, freq/watt, import/export limits

## Fielded Equipment



Smart Inverters  
and Converters



Battery Energy  
Storage Systems



V1G and V2G  
Electric Vehicle  
Supply Equipment

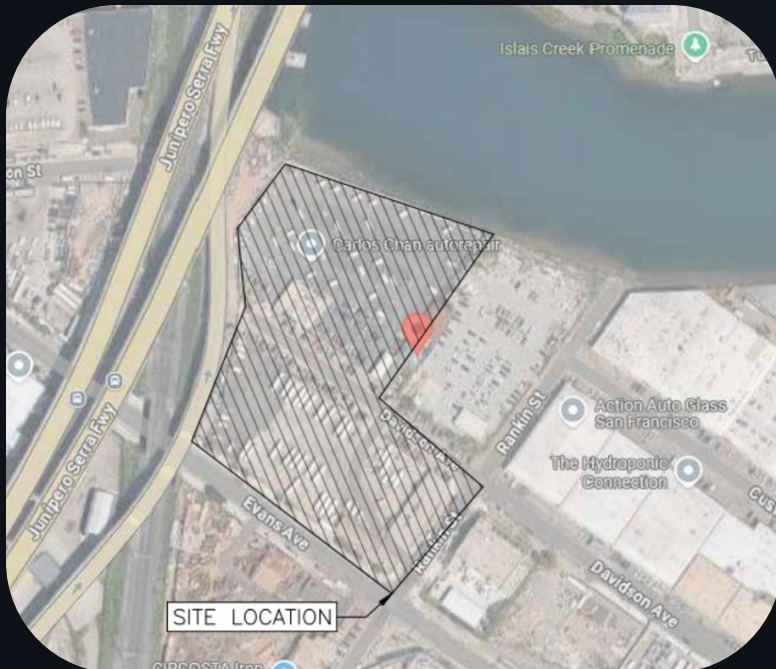


Smart Loads and  
Home/Building Energy  
Management Systems

# Energizing school bus depots

CEC is funding IEEE 2030.5 native networks. We can energize depots under dynamic limits while the service upgrade waits.

- ▶ Grid-forming PV, with the buses themselves as the storage.
- ▶ IEEE 2030.5 FlexConnect gateway to PG&E and SCE.
- ▶ EVGateway prime, Zum, DERSec.



Example: UL 3141 PCS behind 4000 A service in San Francisco: installation of 226 Direct Current Fast Charging (DCFC) stations, consisting of (203) 30 kW and (23) 60 kW chargers.

# PG&E Grid DERMS

## IEEE 2030.5 Network



DER SECURITY

AI Native Cybersecurity for Distributed Energy

IEEE 2030.5 End Devices  
OEM APIs



Integration Breeze

Scalable & Repeatable



**PG&E GRIP Services**  
ICA, LGPs, Network Info

REST API



**Grid DERMS**  
IEEE 2030.5 Head-End Server



**Hourly Flex Pricing**  
Current Day + 7 Day prices  
REST API

Telemetry



Controls



DER SECURITY



**Accelerated**

**DERSync™**  
(IEEE 2030.5 CSIP Aggregator)

**DERSec™ with SunSpec PKI**  
(OT Cybersecurity for DERs)

**DERFlow™ ASP**  
Hourly Flex Prices API Integration



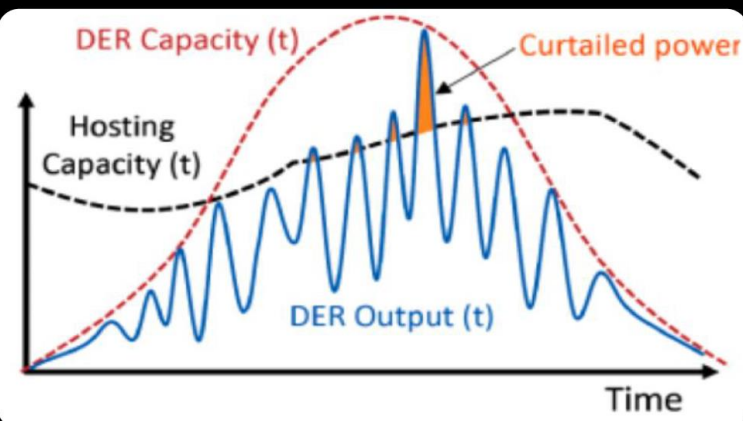
**DERStack™**

DER Interoperability  
OT Cybersecurity  
Network Topology Aware



IEEE 2030.5 and  
SunSpec PKI & Certs

**FlexConnections**



**V2G Fleet Microgrids**



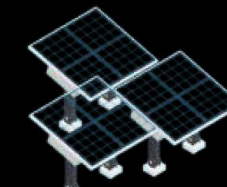
**DERStack Edge with IEEE 2030.5**



V2G

**VPP, Hourly Rates, V2G Export**

**Distributed Energy Resources & IBRs**  
Solar PV + School Buses as Battery on Wheels



**SunSpec Modbus**



**ISO 15118-20**

**Grid-Forming Microgrids**

# Project SYMPHONY

A field-scale VPP coordinating IBRs for distribution services.

- ▶ ~600 kW Qcells residential fleet in San Leandro.
- ▶ 2 MW of Prologis commercial and industrial capacity.

## GRID SERVICE

**Localized Distribution Congestion Relief (Hour-Ahead) Events**

**Distribution Capacity Management (Day-Ahead)**

**Distribution Dynamic Load Shifting**

**Distribution Voltage Management**

**Transmission Frequency Regulation**

**Transmission Fast Frequency Response**

## PG&E PROGRAM

Distribution Services

Dynamic Operating Envelopes (FlexConnect)

Hourly Flex Pricing (via GridX API)

Voltage Regulation (Volt-Var / Volt-Watt)

AGC Following

Contingency Reserves



PROJECT  
**SYMPHONY**  
COORDINATING SECURE, COMMUNITY-CENTERED ENERGY



## Demonstration Core Capabilities



**Distribution-Level Power Quality Services**



**Alleviating Grid Congestion and Infrastructure Constraints**



**Multi-Market Participation and Cybersecurity**

PROJECT SATORI · APACHE 2.0

# Open-source DER software!

## IEEE 2030.5 Client

APACHE-2.0

py20305

IEEE 2030.5 / CSIP client. mTLS, event engine, CLI.

```
$ pip install py20305
```

[GitHub ↗](#) [PyPI ↗](#) [Docs ↗](#)

## SunSpec Modbus

APACHE-2.0

pysunspec2

SunSpec Modbus reference library. TCP, RTU, TLS.

```
$ pip install pysunspec2
```

[GitHub ↗](#) [PyPI ↗](#)

## DER Canonical Models

sunspec/models

Canonical models for inverters, batteries, EVs, meters.

```
> github.com/sunspec/models
```

[GitHub ↗](#)



REFERENCE APP · IOS & ANDROID

## Satori Scout

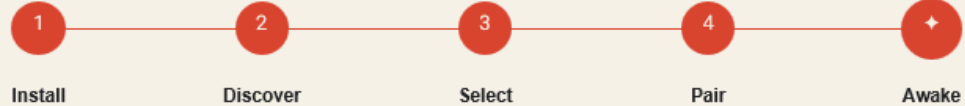
Find a device, awaken it. No laptop.

[App Store](#)

[Google Play](#)

[Commercial Product](#)

[Launching October 2026](#)



**TODAY** Any UL 1741 SB device becomes a compliant 2030.5 client.



open-satori.org



# Work with DER Security

## DER Integration



### DERSync

IEEE 2030.5 Aggregator & Edge

Connect & normalize every DER using open standards, OEM APIs and SCADA

#### DERSYNC INTEGRATIONS & CONNECTORS

##### OPEN STANDARDS



##### OEM CLOUD APIs



##### INDUSTRIAL SCADA



### DERSim

Digital Twins with Offensive Security Testing

SunSpec-certified twins of solar, BESS, fuel cells and V2G chargers  
Cyber-physical test ranges at fleet scale.



### LabTest Pro

Compliance Testing

Communication interfaces and electrical behavior validated to IEEE 1547 and UL 1741 SB.



## Cybersecurity



### Sentry

OT Cybersecurity

Stops commands that look valid — but can disrupt the grid. Cyber-physical detection, SIEM-ready.

#### ENTERPRISE SIEM & SOAR INTEGRATIONS



ONE PLATFORM FOUNDATION — SunSpec PKI root of trust · unified DER data model · 1000+ device library · shared scheduling, persistence & delivery

Connect

Simulate

Validate

Protect

# PANEL and Q&A

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# THANK YOU!

Building the Distribution Grid of the Future

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Thank you for joining us.

Email [membership@sunspec.org](mailto:membership@sunspec.org) with any questions