



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
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Mission

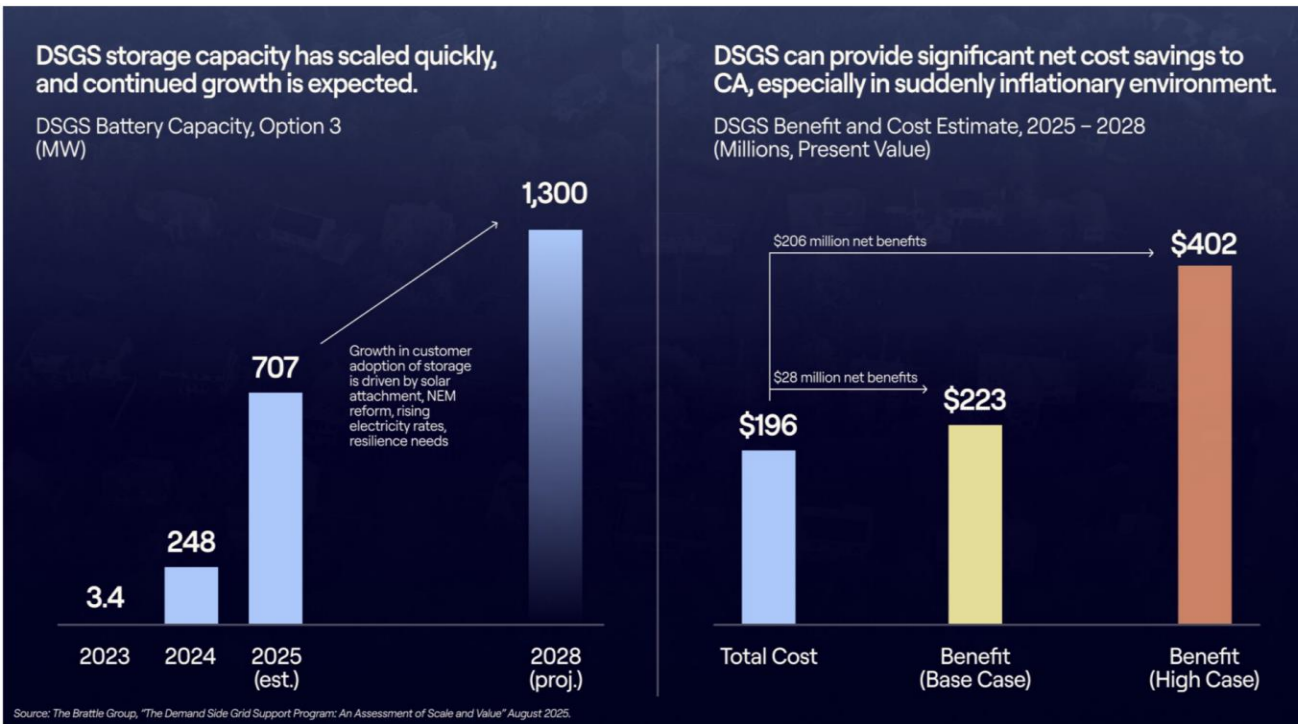
To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

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

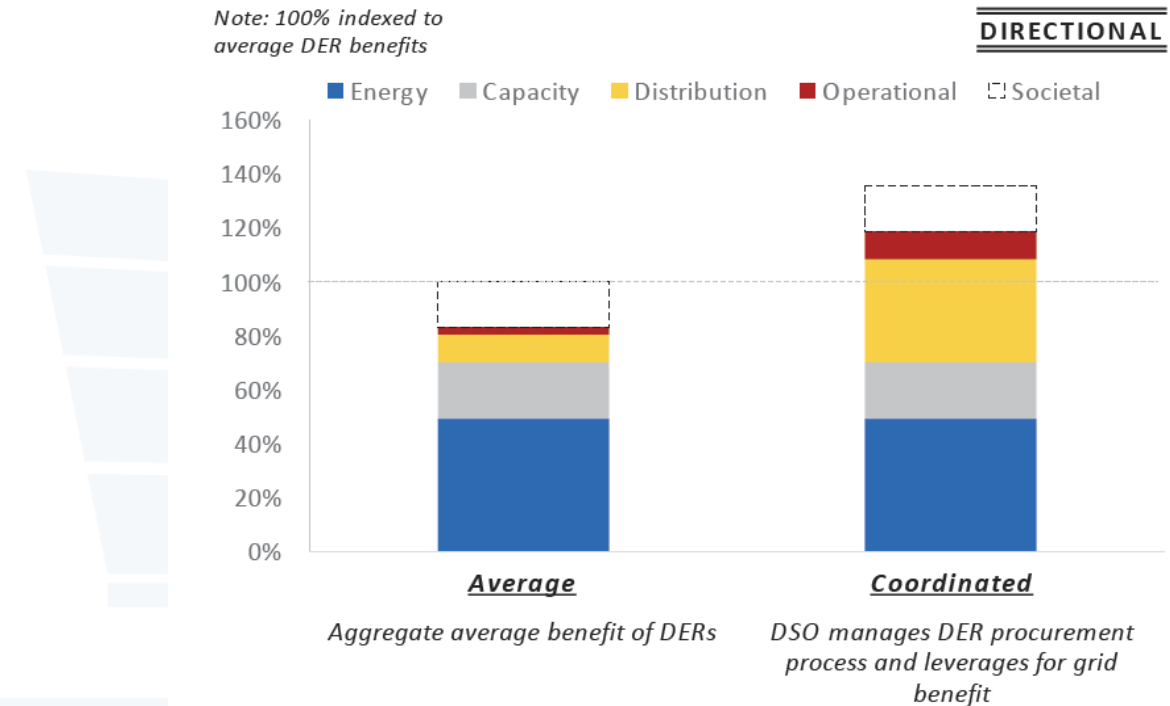
A distribution system operator (DSO) capable of optimizing the grid for DER participation and orchestrating aggregated DER can create significant ratepayer savings by improving grid utilization, avoiding costly infrastructure upgrades, and increasing the pace of electrification.



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



Southern California Edison, September 2016

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.**

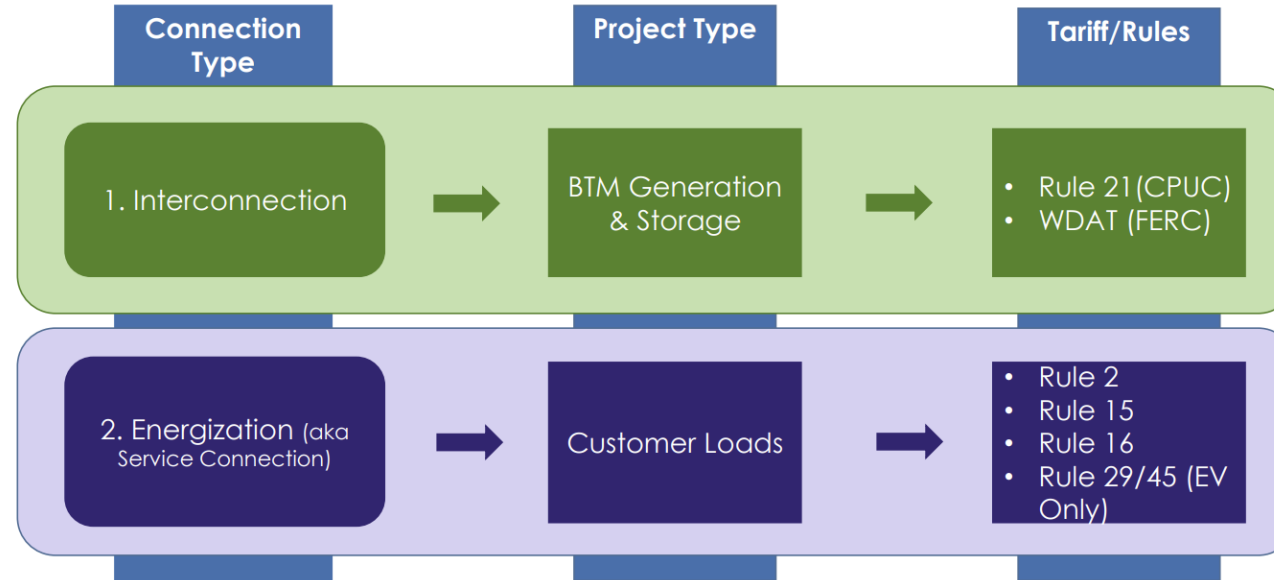
1. Balancing the Grid (three dimensions)

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

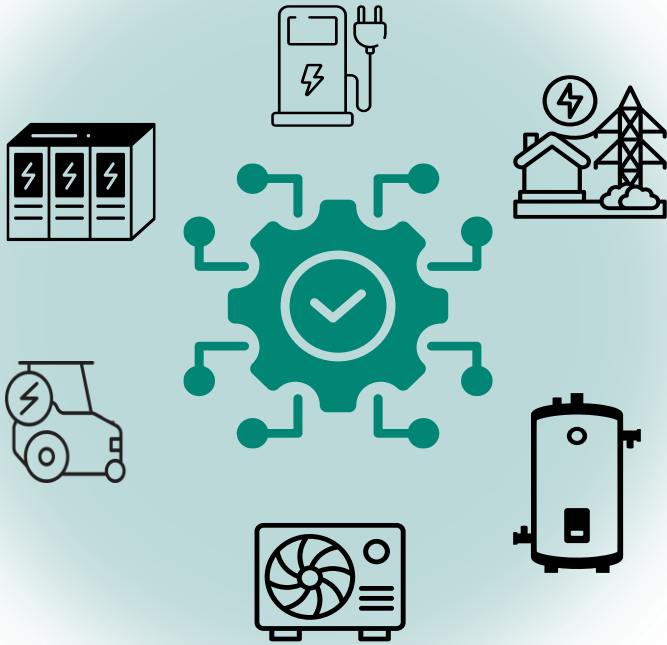
- The DSO should be allowed to identify areas where aggregating DER for a future Community Microgrid deployment creates measurable local reliability and resilience value.
 - This could include substations, critical feeders, end-of-feeder locations, or critical facilities.
 - The CPUC has previously approved 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

Open Markets & Access	Neutral Governance	Interoperability & Communications	Decision-Grade Data
Value & Compensation	M&V / Settlement	Integrated Planning & T-D Coordination	Incentives & Accountability

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

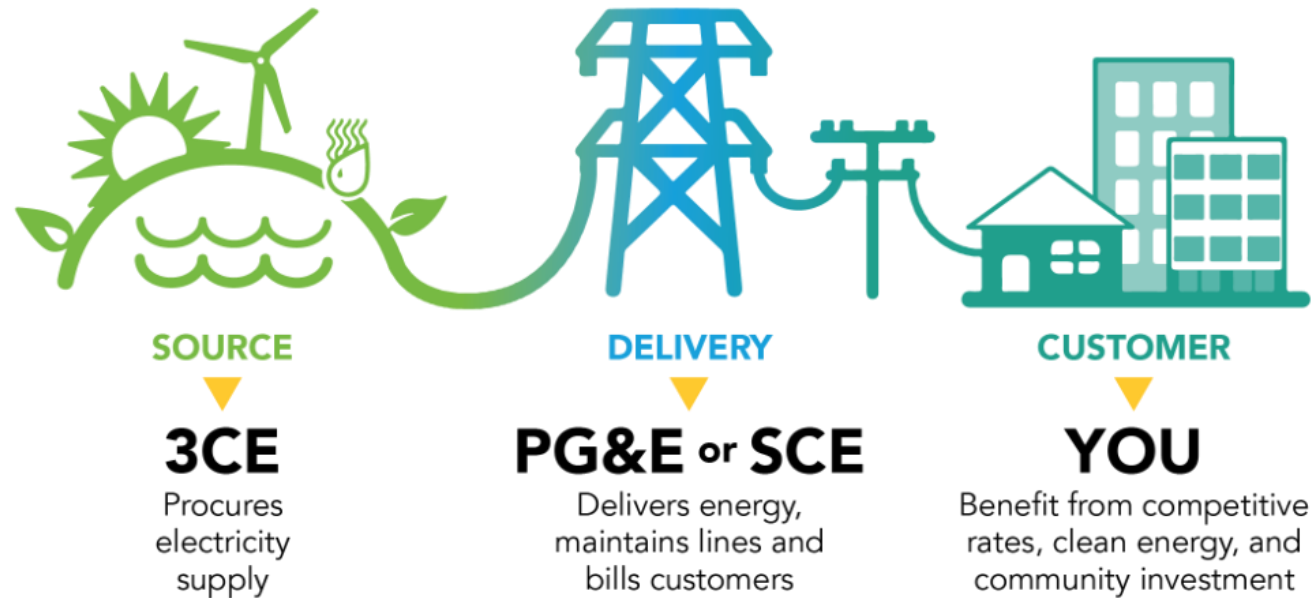
Christopher Cook, PE
Director of Energy Programs



Central Coast
**Community
Energy**

Who is 3CE?

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



Central Coast
**Community
Energy**

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

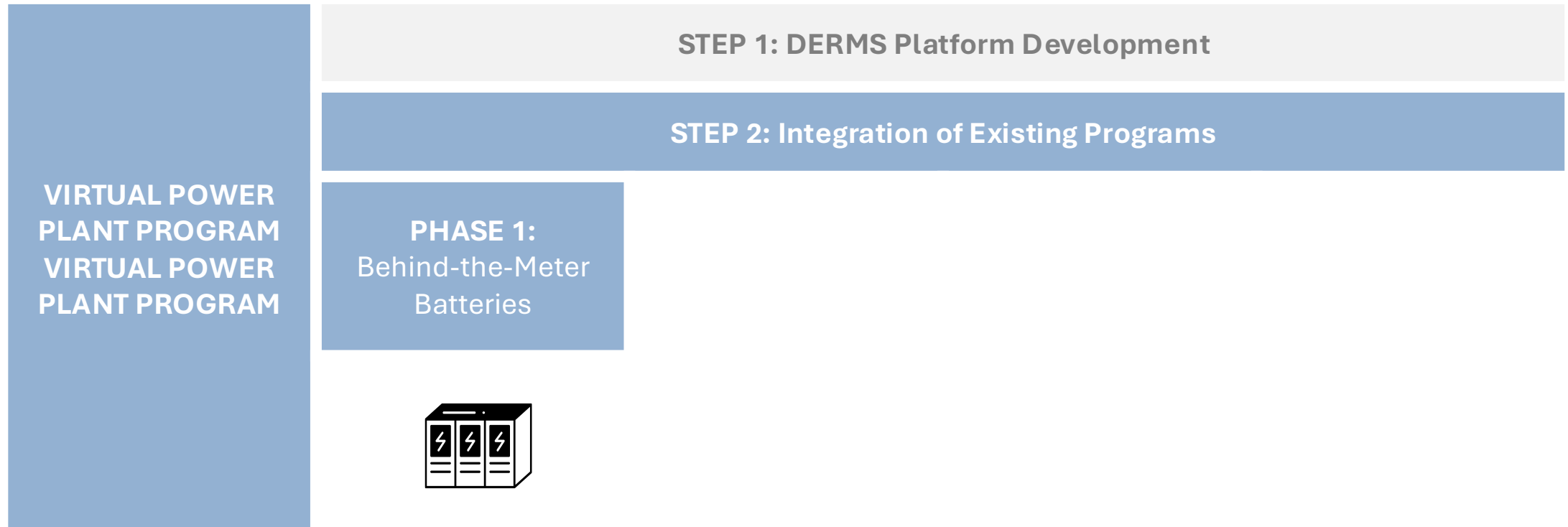


VPP Phases

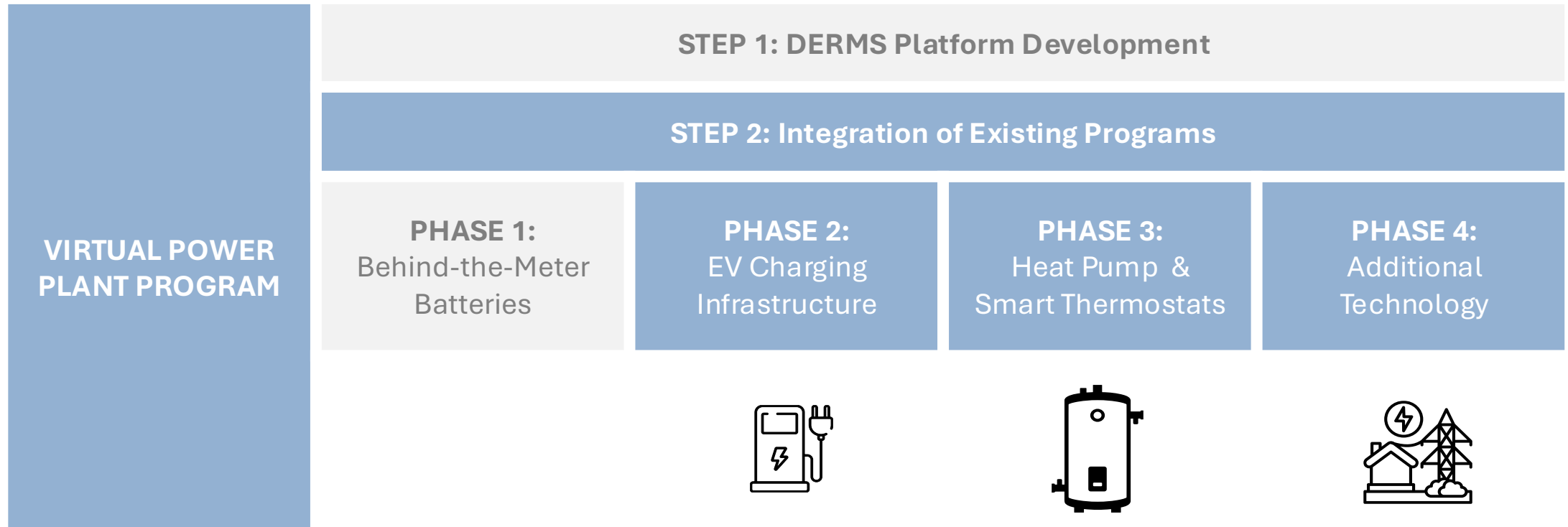
VIRTUAL POWER
PLANT PROGRAM

STEP 1: DERMS Platform Development

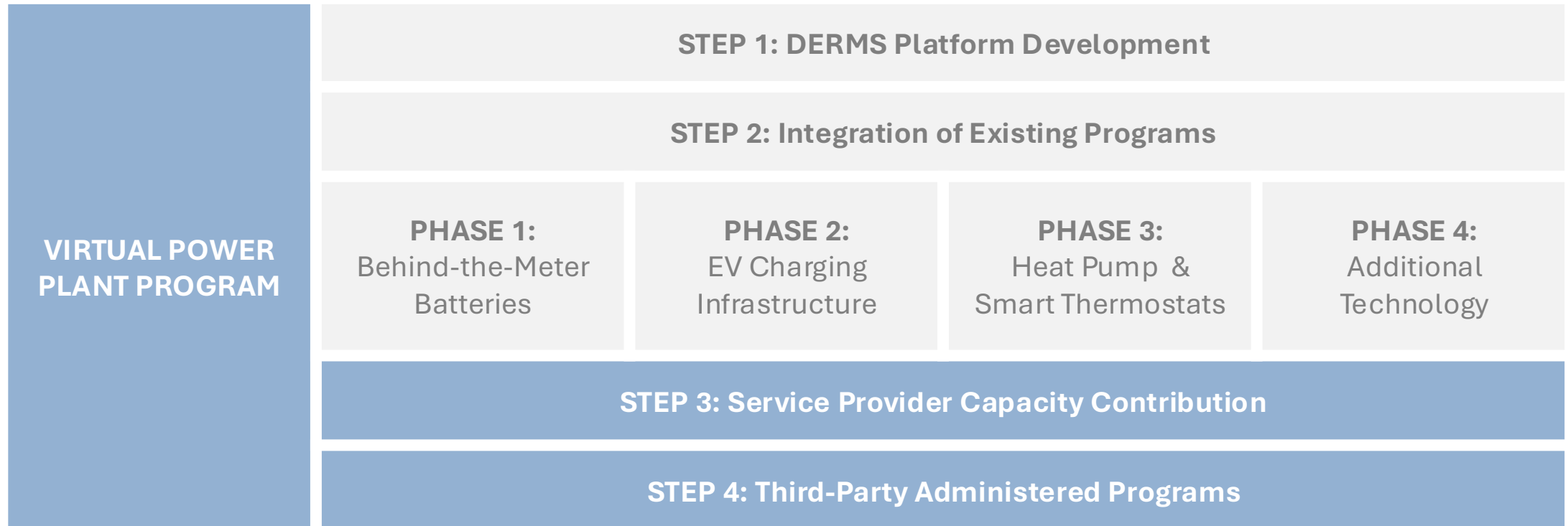
VPP Phases



VPP Phases



VPP Phases



How the Battery Pilot Works

Customer Flow



ENROLL

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

EVENTS

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

INCENTIVES

- ✓ 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

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.



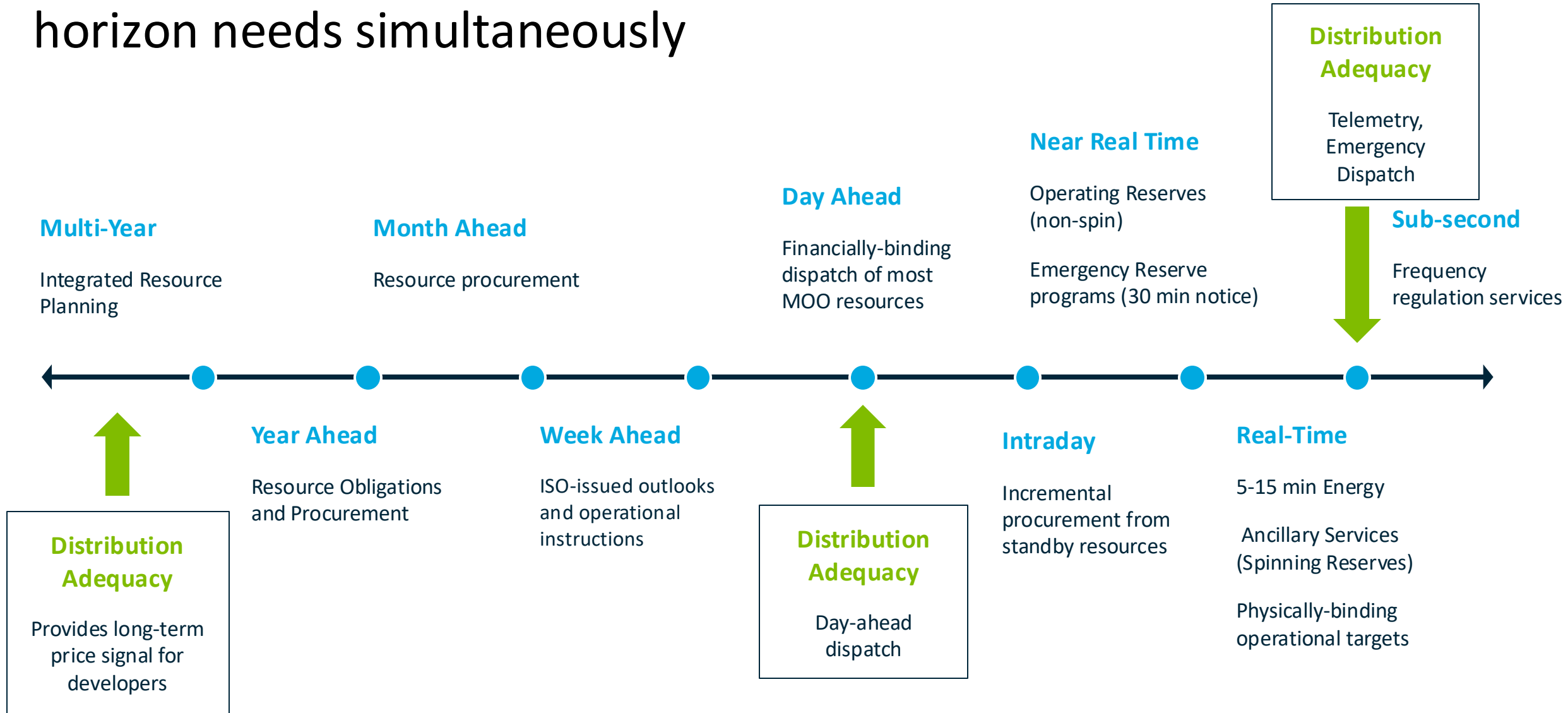
The resource is still **economically dispatched** by CAISO according to price — just with one more locational layer added to the signal.

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 Δ Dist into one Distribution Adequacy price	Calculates Δ 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**

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

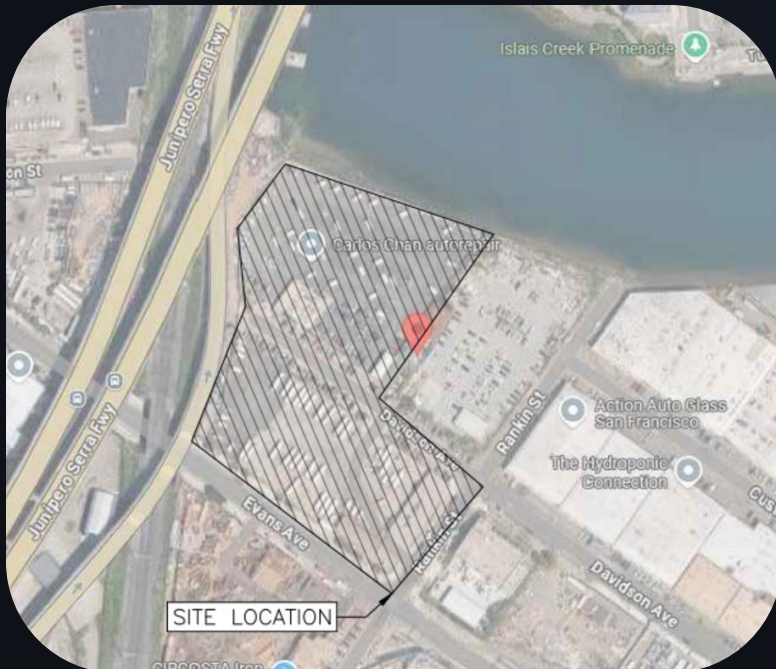


Smart Loads and
Home/Building Energy
Management Systems

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



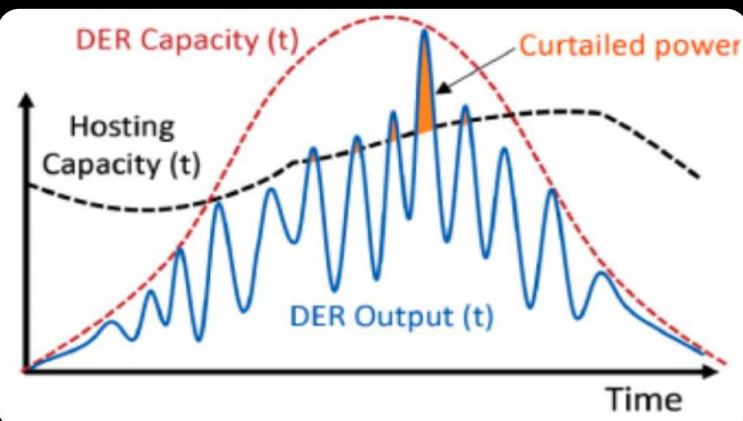
DERStack™

DER Interoperability
OT Cybersecurity
Network Topology Aware



IEEE 2030.5 and
SunSpec PKI & Certs

FlexConnections



V2G Fleet Microgrids



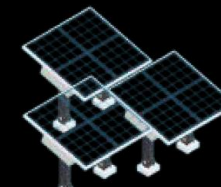
DERStack Edge with IEEE 2030.5



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

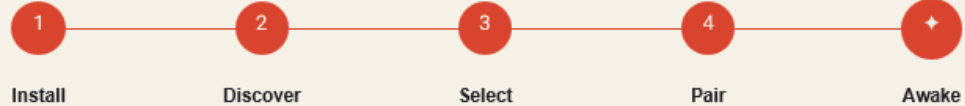
Find a device, awaken it. No laptop.

[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

THANK YOU!

Building the Distribution Grid of the Future



Thank you for joining us.

Email membership@sunspec.org with any questions