

California Climate Policy Summit 2023 Grid for the Future Track the climate center

April 11, 2023

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Harnessing EVs to Enhance Grid Reliability and Resilience

Angelina Galiteva, Moderator

- Daniel Barad, Union of Concerned Scientists
- Steve Letendre, Nuvve
- Patrick Sterns, SunPower
- John Sarter, dcbel





Concerned Scientists

Science for a healthy planet and safer world.

ZEVs on the road



Potential of Bidirectional Charging

- Advance Clean Energy
- Bolster Grid Reliability
- Reduce Dependance on Gas Powerplants
- Reduce Dependence on Diesel BUGs
- Consumer Cost Savings

Looking Forward

- 1. Require bidirectional capability everywhere it makes sense (yay SB 233)
- 2. Ensuring widespread ZEV distribution and access
- 3. Advanced electricity grid coordination

Concerned Scientists

Thank You



V2G—TRANSFORMING EVS FROM GRID DRAIN TO GAIN: CALIFORNIA CLIMATE POLICY SUMMIT 2023

STEVE LETENDRE, PhD VP, POLICY & REGULATORY AFFAIRS APRIL 11, 2023

A GLOBAL FOOTPRINT

- Headquartered in San Diego, CA
- Offices in Newark (Delaware), London, UK, and Copenhagen, Denmark
- 50+ employees
- 25+ years of V2G R&D
- 5+ years of continuous
 V2G commercial
 operations in Denmark
- US focus on electric school bus market

Nuvve reduces the cost of electrification for fleet owners through managed charging and the creation of recurring revenue from valuable grid services using V2G technology.



Denmark

- 5+years of continuous V2G operation
- Total of 43 light-duty EVs located across the country
- Diverse EV users: nurses, port employees, an ad company, and a municipality
- Grid services: frequently regulation
- Supporting Danish offshore wind integration
- Gross, €2,500 per vehicle







AI FORCASTING TOOLS

- EV availability, predicted vs. actual
- Aggregate capacity, predicted vs. actual

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PRECISION RESPONSE • Power requested vs.

- delivered
- System
 frequency



US COMMERCIAL V2G SCHOOL BUS OFFERING

THE LION

• Standard V2G School Buses are available with CCS plugs

BLUE BIRD



- Nuvve offers a complete V2G fleet solution
 - o Buses
 - o Chargers
 - o Installation
 - o Financing





Rhombus





ELRP PROGRAM RESULTS

10 Events between 17 August and 09 September 2022





V2G–Today & the Future MW-20 The Plug 1. 4) ())00 \bigcirc {o} {0 Location of DC to 2. AC conversion Interoperability 3. V2G-V2G-DC AĊ **Utilities/Regulation** 4. V2G Unit **Electric Vehicle** Ridirectio High Voltage ••• Control Unit Control Uni the climate center

THANK YOU

Contact: Steve Letendre, PhD <u>sletendre@nuvve.com</u> 802-779-3580



V2G charging solutions: <u>https://nuvve.com/</u> _{NUVVE.COM} <u>contact/</u> SUNPOWER®

April 11th, 2023

Harnessing Electric Vehicles to Enhance Grid Reliability and Resilience

Patrick Sterns

Director, Western States Policy and Strategy

Patrick.sterns@sunpowercorp.com

SunPower | © 2023 SunPower Corporation

About SunPower

SunPower helps enable electrification with whole-home, multifamily and EV solutions

SunPower is a leading clean energy provider delivering solar, storage and other renewable energy solutions to people in North America. Established in 1985, headquartered in Richmond, California, SunPower's rich history is filled with innovation, quality, record-breaking technology, passionate and inspired employees, and a commitment to changing the way our world is powered.



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37 Years
Industry experience.
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- Powering 7.5M Homes Per Year With over 15 gigawatts installed to date.
- Q
- Backed by Total The seventh largest energy company in the world.
- Industry-Best Technology Go-to choice of forward-thinking homeowners.



Local Experts

Supporting homeowners and local economies in 49 states.



Providing an Ecosystem of Electrification and Home Energy Solutions

We make the clean energy transition easy both single-family and multifamily homes

1. Solar

- a. InvisiMount[®] Integrated Mounting Solutions
- b. Microinverters behind each panel for better functionality
- C. PV panel level monitoring

2. Storage

- a. Hub+[™] control and monitoring hardware
- b. Modular energy storage

3. EV Charging

- a. Preferred EV charger installer for Wallbox and GM
- b. Collaborating with GM on bi-directional charging solutions

4. Grid Services

- Opportunity to respond to signals and aggregate distributed resources
- b. Contribute to resiliency





Notable Partnerships

Collaborating with leaders to electrify and manage the home of the future



General Motors: Solar and bidirectional charging





Wallbox: Bidirectional Charging

Department of Energy: Energy-Smart Connected Communities Microgrid



OhmConnect: Demand response and load management



KB Home: Energy-Smart Connected Communities, New home electrification



American Automobile Association Southern California: Solar and Electrification Transportation



Patrick Sterns

Director, Western States Policy and Strategy

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Thank You

Changing the way our world is powered





California Climate Policy Summit 2023

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Transportation "Fuel" & Power stations are moving into the home.

However, the current solution is a patchwork of limited, inefficient & expensive industrial devices with no intelligence & no energy market access.

New legislation is opening the residential energy market and resetting the **EV** charging & solar industry playing field.



When "Charging with the Sun", current solutions waste >25% of energy between panels and EV

payback time

Current systems are expensive due to power electronics limitation and have no software/intelligence



"Fuel" & Power stations are moving into the home.

V2H additional Saving over V1G: \$532 / Year (9.6kW, 3000 sqrt home, PG&E EV2-A tariff)

> 2023 CA SB 233 (EV must be V2X ready and interoperable)

"2025: Bonus-Malus 2027: Mandatory"

2018 CA SB 100

(Mandatory Solar for every new home)

DC Power

Analytics & Energy Services

V2H

Solar

Energy

EV Charging Grid

Stationary Battery AC

Power

Grid

Collaboration

Blackout

Protection

2022 FERC 2222

003

(Residential Energy Market Deregulation)

> Energy Market

"Aggregated residential energy can now compete with the power plant down the street" - Neil Chatterjee, FERC Chairman

2023 CA NEM 3

(From PPA to real-time pricing)

"Residential Energy storage & Grid Edge intelligence is now mandatory"



Introducing the dcbel Home Energy Station: the world's first Al certified residential <u>universal</u> bidirectional DC charger

(that is also a solar inverter)

From \$2,699 (9.6 kW) - Fall 2023 \$4,999 (15.2 kW) - June 2023

- 5 cornerstone patents granted
- 9 patents pending
- 15 new patents in preparation

(all patents filed in 50 countries)





dcbel patented technology bridge's modern home needs for DC and AC energy, reducing complexity, energy <3 Years losses and cost.



Payback time

A significant reduction in hardware cost combined with powerful energy optimization algorithm. Enables a new industry leading ROI

>25%

Efficient

gain Connect your Solar system directly to your EV & ESS charging is now 25% more efficient using dcbel patented technology

Smart! 250k decisions per day

Trade, store, buy, charge, prioritize, forecast, predict, measure, analyze, optimize.



Seamlessly.

Thank you!

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Microgrids as Resilience Solutions

Allie Detrio, Microgrid Resources Coalition, Moderator

- Erin Weber Kiel, Sunnova
- Selena Feliciano, Energy Democracy Project











Community Microgrids:

Unlocking Opportunities for Energy Democracy, Resilience & Decarbonization in California

Sunnova Energy Energy Democracy Project Microgrid Resources Coalition CA Climate Policy Summit April 11, 2023



CALIFORNIA

PG&E warns over 500,000 customers of possible rotating outages as California heat wave drags on



Los Angeles Times

Mass storm outages bring misery across California, exposing power grid's vulnerabilities

San Francisco Chronicle

CALIFORNIA WILDFIRES

Power outages hit some of state's poorest communities hard



sunnova

Advancing the Grid

Future of Community Microgrids

Erin Weber Kiel, Senior Manager of Government Affairs

sunnova





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The CA Legislature directed the "commercialization" of microgrids in 2018

SB 1339 (Stern)

Copyright 2023

Transition microgrids from its current status as a promising emerging technology to a successful, effective, safe, reliable commercial product

Help California meet its future clean energy goals and provides end-use electricity customers new ways to manage their energy needs

Microgrids Achieve Core California Policy Objectives



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Solar Microgrid At Work





Simulation for a home within the community





Community simulation including homes and gathering spaces



82% of power provided from sustainable resources within the microgrid

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Trials & Tribulations of CEC-funded Community Microgrid Projects

All faced unnecessary obstruction, design concessions, and needless project delays

- City of Berkeley
- Oakland EcoBlock
- City of Lancaster
- City of Bassett-Avocado Hts
- City of Richmond
- Port of Long Beach
- Many others!!

Figure 1: Berkeley Energy Assurance Transformation Building Locations



Figure 2: Berkeley CEMC Conceptual Schematic (Prototype 1)



Berkeley BEAT

- Major PG&E interconnection challenges
- Excessively high costs for new or modernizing existing electric lines
- "Over-the-fence" rules (PUC 218) is a barrier for crossing rights of way
- No rates and tariffs for maximizing value of microgrid benefits
- In both blue sky and black sky conditions

EcoBlock Vision: A Multi-Customer Microgrid Solution

Electrical system combines DER

- Communal rooftop solar PV
- Communal energy storage system (flywheel and/or battery)
- Intelligent loads and electric demand response
- Shared Electric vehicle (EV) charging
- Smart controls in a direct-current (DC) microgrid infrastructure

behind a single interconnection with PG&E





Community Microgrid at Blue Lake Rancheria

Microgrid Design

Solar: 420 kW AC PV ground-mounted array

Energy Storage: 500 kW / 950 kWh lithium-ion battery storage

Software & Controls: Siemens Spectrum Power 7 Microgrid Management System and Schweitzer Engineering Laboratories Protection Relays

Other Infrastructure: Purchased distribution system infrastructure to create a new point of common coupling with the grid, integrating six buildings into the microgrid behind one electric meter

Technology Integration: The Schatz Energy Research Center at Humboldt State University

UNIQUE PROJECT ASPECTS

- ✓ American Red Cross shelter
- ✓ Successfully islanded during several unplanned utility outages due to weather and nearby wildfires
- ✓ Can deploy five levels of load shedding depending on the outage and system conditions
- ✓ Achieving cost savings: 58% overall energy







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Q&A – Thank You!

REFOCUS REIMAGINED ENERGY FOR OUR COMMUNITIES







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Projects and Policy

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- Joanne O'Neill, Clean Power Alliance
- Teresa Cheng, Sierra Club
- Jin Noh, California Energy Storage Alliance





Building the Grid for the Future Presented by Ardi Arian

April 11, 2023



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WHICH INVENTOR WOULD BE MOST SURPRISED?



DeLorean from Back to the Future



First Radio G. Marconi (1874 – 1937)



First Phone A. Graham Bell (1847 – 1922)



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First Utility (59cust.) Thomas Edison (1847 – 1922)



CALIFORNIA'S NEEDS & TARGETS

60% RENEWABLE BY 2030 & 100% DECARBONIZATION BY 2045

Advancing the use and availability of renewable energy is critical to achieving California's ambitious climate change goals. California's load-serving entities are required to increase their procurement of eligible renewable energy resources to 60% of retail sales by 2030, with the electricity sector targeting 100% renewable and zero-carbon resources by 2045.

DECENTRALIZED & DISPATCHABLE CLEAN POWER

Solar on rooftops are well served and continuously growing. Large utility-scale is providing clean power in south and central CA. Distribution-connected clean power generation combined with energy storage can maximize grid reliability for the whole community. But this market is underserved, and current projects are overpriced. Energy storage is needed to support the continued integration of renewables.

PUBLIC SAFETY POWER SHUTOFFS & RECOVERY AFTER DISASTERS

Recent rolling blackouts and natural disasters like wildfires create a big challenge for the community and all stakeholders. Blackouts need to be prevented, and quick recovery after disasters is crucial.









WHAT KIND OF GRID TRANSITION IS NECESSARY?

LOWER

TRANSMISSION

GENERATING



RESOURCES Grid Transition INCREASE DISTRIBUTION GENERATING

RESOURCES





PROJECT PIPELINE

Renewable America has over 268 megawatts (MW) of solar and 597 megawatt-hours (MWh) energy storage projects under development throughout California. Our projects are strategically located to provide maximum benefit to the region, while also meeting the community's demand needs.

- 1,000+ parcels assessed
- 400+ land owners qualified
- 🤣 30+ projects under development





Last updated March 17, 2023





THANK YOU! For further information please visit our website

www.renewam.com or email me at ardi@renewam.com



Power Ready: Clean Energy Resiliency Program

California Policy Summit April 11, 2023





- Clean Power Alliance
 Overview
- Importance of Clean
 Energy Resiliency
- Power Ready Program

Joanne O'Neill

Director of Customer Programs





Clean Power Alliance





About Clean Power Alliance



CPA

- Joint Powers Authority in 32 communities across Ventura and Los Angeles Counties (35 online in 2024)
- Serving 3 million residents and businesses (approximately 1 million customer accounts)
- 4th largest electricity provider in California
- Largest CCA (Community Choice Aggregator) in California
- More customers receiving 100% renewable energy than any other utility in the nation



Local Programs for a Clean Energy Future

By 2025, our strategic plan calls for \$200 million of investments in the communities we serve in three areas:

Resilience & Grid Management



Building & Transportation Electrification



Local Procurement





Importance of Clean Energy Resiliency





The Need for Resilience



CPA

More frequent, unexpected power outages are occurring:

- Increased wildfire threat and severity
- Public Safety Power Shutoff (PSPS) events
- Rising temperatures and more extreme heat
- Increased summer grid stress due to high heat

• More extreme droughts Backup power systems at critical facilities are often lacking and when present often rely on diesel generators that contribute to GHG emissions and poor local air quality



Fire Hazard Severity Zones of California.

Building Community Resilience

- CPA conducted a survey of local governments to learn about each agency's resilience goals
- Many showed interest in solar powered battery storage system at a facility that provides a critical community or municipal function in times of an outage
- CPA developed a program that served its member communities to help achieve a level of resilience for critical loads





Power Ready





Power Ready Overview

What is Power Ready?

- Power Ready is a resiliency program where CPA member agencies have the opportunity to host a solar powered battery storage system at a facility that provides a critical community or municipal function in times of an outage.
 How Does it Work?
- Batteries can be discharged at peak times to provide more cost-effective electricity prices for our customers.
- During outages, the member agency will get the benefit of islanded backup power.
- CPA contracts with a single developer to build, own, and operate the systems for 20 years.

Types of Facilities:

- Community Centers/Parks
- City Halls/Civic Centers

- Police/Fire Stations
- Public Works





How Does This Work?



the


Program Benefits

Municipality

Host a turnkey clean backup power system that provides islanded power during outage

No up-front cost and no monthly bill increase

Backup power to support critical loads in an outage

The developer handles all operations and maintenance

CPA

Community

Community gets the benefits of a resilient critical facility during an outage

Systems contribute to enhanced grid resilience

Reduced local emissions associated with diesel generators

CPA/Custo mers

Offers CPA opportunity for demand side management/ demand response

Lowers procurement costs during most expensive hours

Delivering public goods programing



Thank you







A JOINT INITIATIVE OF CEJA & THE SIERRA CLUB

Power Up Clean Energy I Power Down Dirty Gas

Who is Regenerate CA?













California's Energy Mix





Why Retire Gas?

- Climate
- Infrastructure
- Economic
- Air pollution

Gas Plants in California



Sector	Plant #	Capacity (GW)		
Electric	167	38.51		
Other	79	2.12		
All	246	40.63		

EJ Communities



CalEnviroScreen DAC

CEJST Disadvantaged Communities



Gas Plants Are Not Reliable



During last year's 9-day heat wave, outages and derates coincided with high demand

Diesel BUGs

EXECUTIVE ORDER N-14-22

- 6. Any restrictions on the use of prohibited resources adopted by the Public Utilities Commission under Decision 16-09-056, Ordering Paragraphs 3 and 4[b], and as implemented in the tariffs of regulated energy utilities, are suspended for any non-residential customer who is enrolled in the Base Interruptible Program or Agricultural & Pumping Interruptible Program.
- 7. Any restrictions on the use of prohibited resources adopted by the Public Utilities Commission under Decision 21-12-015, Conclusion of Law 33, and as implemented in the tariffs of regulated energy utilities, are suspended for any non-residential customer who is enrolled in the Emergency Load Reduction Program.

Clean Energy Solutions



- Distributed Energy Resources
- Energy Efficiency & Demand Response
- Solar & Storage
- Offshore Wind
- Geothermal

CARB 2022 Scoping Plan

- In Alt 1, builds ~62 GW of battery storage and ~30 GW of hydrogen fuel cells as clean firm capacity
- Alt 1 builds ~124 GW of solar, compared to ~26 GW in the BAU
- Alts 2 through 4 are similar in 2045 due to SB100 goal, while in Alt 1 the model builds significantly more clean energy resources to meet the 0 MMT, no combustion target
- In Alt 3 scenario, model builds ~90 GW of solar and ~40 GW of batteries to meet SB100 retail sales target. All gas remains online and ~10 GW of new gas is built



Photo Credit: Mari Rose Taruc

Source: California Air Resources Board

California Public Utilities Commission



Grassroots Organizing

- 30 million metric ton by 2030 target
- Committed to develop a gas plant retirement scenario
- 4 GW new clean energy procurement

Thank you!

Sign our petition at <u>sc.org/IRP23</u>

Teresa Cheng teresa.cheng@sierraclub.org

Regenerate California Campaign





Our CESA Members





A Brief History of Storage in California



We Cannot Focus Just on Transmission



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Source: LBNL Queued Up Report (April 2023)

Regulatory Models Need to Adapt to BTM ES

Figure 1: Representation of QC of BTM ES versus IFOM ES



Source: Joint DER Parties Proposal in CPUC R.21-10-002

Figure 6: Representation of DERA versus IFOM ES at DGD Nodes



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- Efficiencies closer to load
- Use built environment (less land use)
- Quicker interconnection (though
- intervestents needed) resiliency, bill savings)

Virtual Power Plants Behind Customer Meter





Requiring local generation and storage to "wheel" power to system to "count" as "count" as

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Source: DOE End-Use Load Profiles for the U.S. Building Stock (March 2022); NREL LA100

DER Interconnection Report Card

Table 63. Summary of NEM Key Tariff Step Timeline Results

Timeline Step*	PG&E Count	PG&E % Met	SCE Count [†]	SCE % Met	SDG&E Count	SDG&E % Met
Expedited 30-day provision for NEM projects	185,908	96.3%	82	90.1%	71,250	99.1%
Time to validate application	188,737	86.7%	85	96.3%	67,954	97.4%
Time to notify customer of application deficiencies	58,051	83.9%	47	90.4%	Not analyzed [‡]	
Time to respond to notification deficiencies	30,026	61.0%	25	93.7%	Not analyzed [‡]	
Time to complete IR	188,680	96.9%	85	100%	Not analyzed	

Good performance on interconnection timelines for smaller and solar-only NEM
systems, but more mixed performance with larger systems and NEM with storage

Table 112. Summary of Non-NEM Key Tariff Step Timeline Results

Timeline Step*	PG&E Count	/ PG&E % Met	SCE Count [†]	SCE % Met	SDG&E Count	SDG&E % Met
Time to validate application	144	17.4%	911	25.0%	133	82.7%
Time to notify customer of application deficiencies	311	98.4%	122	55.7%	Not analyzed [†]	
Time to respond to notification deficiencies	143	49.0%	65	58.5%	Not analyzed	
Time to complete IR	131	34.4%	685	43.1%	132	72.3%
Time to complete SR after IR	11	27.3%	108	50.0%	Not applicable [‡]	
Time to complete SIS after DSA Execution	1	Met [§]	Not analyzed		Not analyzed	
Time to complete SIS after IR or SR	Not app	licable	15	93.3%	1	Met
Time to send GIA to customer after IR or SR	101	76.2%	403	45.2%	127	96.9%
Time to se nd GIA to customer after SIS	1	Met	8	100%	1	Met
Time for customer to execute GIA	82	84.1%	408	80.6%	129	38.8%

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* See Table 14 for the tariff-derived timeline requirements for each step.

† Not analyzed means that the analysis was not performed due to missing or incomplete data.
 ‡ Not applicable means that the step was not relevant to any project in the project population.

Major improvements needed on performance on interconnection timelines for non-NEM and complex DER systems, including Source: Guidehouse Rule 21 milerconnection Age and

grid?

Notification-only, checklist process

next for true

plug-and-play





Questions?

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