



12th Annual CCEC Forum: Webinar 12

August 19, 2021 | 10:00 - 11:00 am

Leveraging Solar & Battery Systems to Lower Costs & Increase Resiliency

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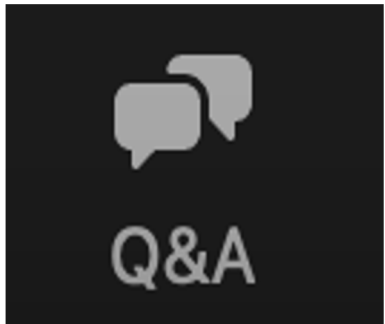


Zoom Features

Q&A

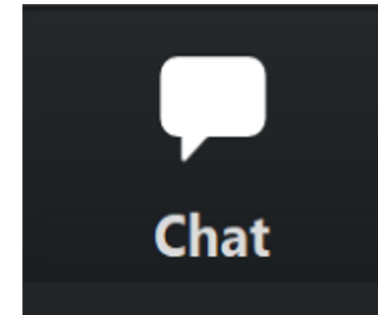
Submit questions for panelists through the Q&A module at any point during the webinar.

Upvote questions that you are interested in.



Chat

Communicate with other participants or reach out to LGC staff if you encounter technical issues.



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LEVERAGING SOLAR & BATTERY SYSTEMS TO LOWER COSTS & INCREASE RESILIENCY

CCEC Forum – August 19, 2021



TODAY'S PRESENTERS



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*We are an independent energy advisory firm
proudly supporting California Public Agencies for the past 12 years with
solar PV, battery storage, and energy resiliency projects*



551 kW Solar PV System
Woodland, CA



335 kW / 669 kWh Battery System
Pleasanton, CA

TODAY'S SESSION

Leveraging Solar & Battery Systems to Lower Costs & Increase Resiliency

Considerations for New Project Opportunities

Considerations for Agencies that Have Existing Solar



CONSIDERATIONS FOR NEW PROJECT OPPORTUNITIES

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SOLAR + BATTERIES = SAVINGS + REVENUE



SOLAR PV SYSTEMS

generate clean, low-cost electricity

generate energy **cost savings** by reducing electric utility bills

generate **revenue** via monetizing Renewable Energy Certificates



BATTERY ENERGY STORAGE SYSTEMS

are a powerful resource for generating financial benefits

generate **cost savings** by reducing demand and shifting load to less expensive hours

generate **revenue** via participating in grid services programs

EXAMPLE PROJECT

TerraVerde recently celebrated the completion of a solar + battery project that we developed on behalf of a Northern California County that is projected to yield \$2.3 million in savings over the 25-year term of the Power Purchase Agreement.

Project Specifications	
Energy Technologies	615 kW Solar PV 464 kWh Battery Storage
Financing	25-Year Power Purchase Agreement (PPA)
Site Host	County
Utility	PG&E

25-Year Summary Financial Performance	
Utility Bill Savings	\$4,523,606
PPA Payments & Asset Management	(\$2,407,845)
Renewable Energy Certificate Revenue	\$206,897
Net Financial Benefit	\$2,322,658

BACKUP POWER SUPPORT

When combined with the proper controls, switching, and load management technologies, solar PV & battery energy storage systems can also provide backup power support for critical loads during wildfire related power outages or heat-wave related rolling blackouts.



An Important Piece of the Puzzle

The Financial Value of Backup Power

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RECURRING POWER OUTAGES ARE COSTLY

For one School District in Northern California, when the power goes out for more than 6 hours, they are required by law to dispose of their refrigerated and frozen foods. Here is the cost of that spoilage across 5 locations:

Site	Food Spoilage Costs
Warehouse	\$50k (freezers), \$10k (refrigerators)
Central Kitchen / Junior High A	\$100k
Junior High B	\$9k (freezers), \$10k (refrigerators)
High School A	\$17.5k (freezers), 10k (refrigerators)
High School B	\$10k (freezers), 10k (refrigerators)
Total	\$226,500



11126.98 The Economic Value of Resilience (EVoR)

*TerraVerde's defensible accounting methodology for
quantifying the financial benefits of having
solar + battery backup power resources*

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EVoR =

**AVOIDED COSTS
OF OTHERWISE
APPLICABLE
SOLUTION**

+

**AVOIDED COSTS
OF POWER
INTERRUPTION**

*Equipment & Installation
Operation & Maintenance
Fuel Costs
Operating Permits*

*Business Interruption Costs
Electrical Equipment Damages
IT System Damages
Productivity Losses
Perishables Spoilage*

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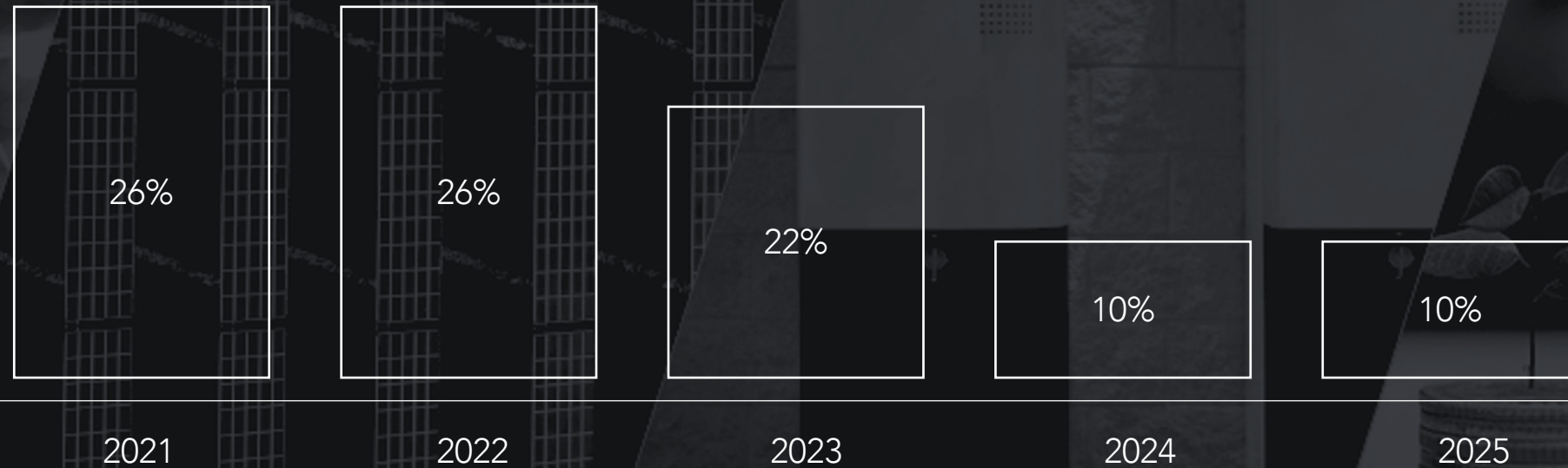


Substantial incentives are available,
but they are moving quickly

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FEDERAL INVESTMENT TAX CREDIT (ITC)

- Stand-alone solar projects and solar + battery projects qualify for this incentive
- Currently provides a tax credit of **26% of the project costs**
- Third-party project owners can claim this benefit and share this value with schools through reduced agreement payments
- This incentive will soon begin **stepping down in value annually** (based on when projects commence construction)



CALIFORNIA'S SGIP PROGRAM PROVIDES RICH INCENTIVES FOR BATTERIES

Incentive Category	Base Incentive (Large-Scale Budget)	Richer Incentive (Resiliency Adder)	Richest Incentive (Equity Resiliency)
Available To*	All Public Agencies**	Critical Facilities in high power-outage risk areas	Critical Facilities in low-income and high power-outage risk areas
Incentive Level	Covers ~30% of the Cost	Covers ~50% of the Cost	Covers ~100% of the Cost

** Note: the SGIP program has very specific qualifiers for these various metrics.
For further detail, find our article at terraverde.energy/terrablog.*

*** Agencies must take electricity or gas service from SDG&E, SCE, SoCalGas, or PG&E*

FUNDING FOR THE SGIP PROGRAM IS GOING FAST!

Funding Available for Base-Level & Resiliency Adder Incentives

Service Territory	Available Funding As of 8.16.21	Difference Over Past 6 Months	Estimated Time to Zero
SDG&E	\$18.5 million	(\$3.5) million	> 1 year
SCE	\$9.6 million	(\$12.4) million	< 6 months
SoCalGas	\$14.4 million	(\$0.6) million	> 1 year
PG&E	\$14.7 million	(\$18.3) million	< 6 months

FUNDING FOR THE SGIP PROGRAM IS GOING FAST!

Funding Available for the Equity Resiliency Incentive

Service Territory	Available Funding As of 8.16.2021	Difference Over Past 6 Months	Estimated Time to Zero
SDG&E	\$0.0 million	(\$0) million	Fully subscribed
SCE	\$0.0 million	(\$92) million	Fully subscribed
SoCalGas	\$35.7 million	(\$10.3) million	> 1 year
PG&E	\$0.0 million	(\$0) million	Fully subscribed

CALIFORNIA'S NEM PROGRAM IS CHANGING, AGAIN

- Net Energy Metering (NEM) is California's program for generating electricity bill credits from on-site energy projects
- In 2016-2017, the original NEM program was replaced by NEM 2 which provided less savings opportunity for new projects
- Proceedings are currently underway for the development of NEM 3
- Expected to take affect in 2022
- Expected to provide less savings opportunity than NEM 2

If you are considering energy projects, get your interconnection applications submitted this year, while NEM 2 is still available.



CONSIDERATIONS FOR AGENCIES WITH EXISTING SOLAR

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SOLAR CHALLENGES THAT PUBLIC AGENCIES ARE FACING

FOR ALL AGENCIES THAT HAVE SOLAR

System Performance Issues

Retail Rate Changes

FOR AGENCIES THAT

OWN THEIR SOLAR

Equipment Replacement

FOR AGENCIES THAT

HAVE SOLAR PPAs

Solar Rates & Escalators



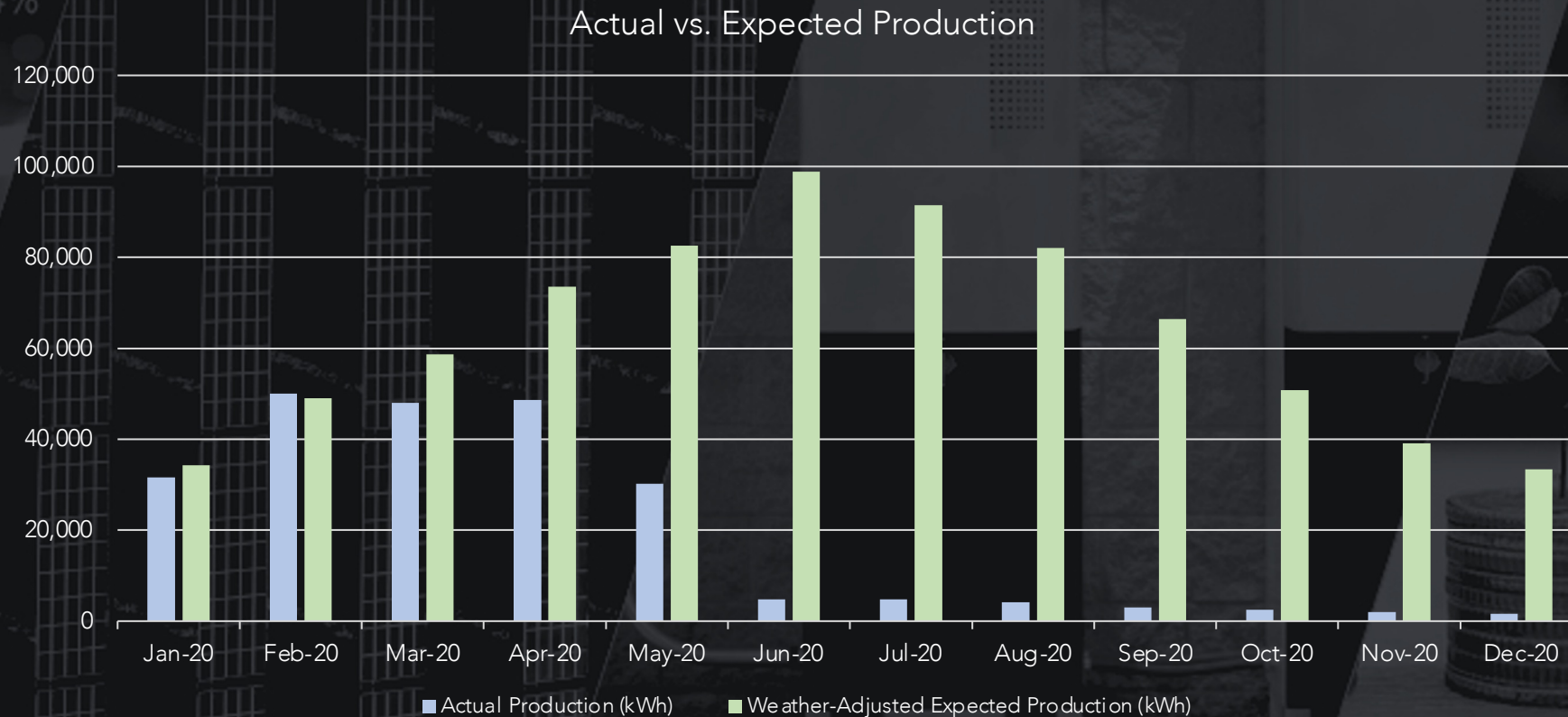
CHALLENGES FOR ALL AGENCIES THAT HAVE SOLAR

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SOLAR CHALLENGES THAT PUBLIC AGENCIES ARE FACING

Poor System Performance

Without the proper monitoring and maintenance programs, many solar PV systems are operating well below their full capacity. For example, a recent review of one agency's system revealed that the system was performing at only 5% of capacity.

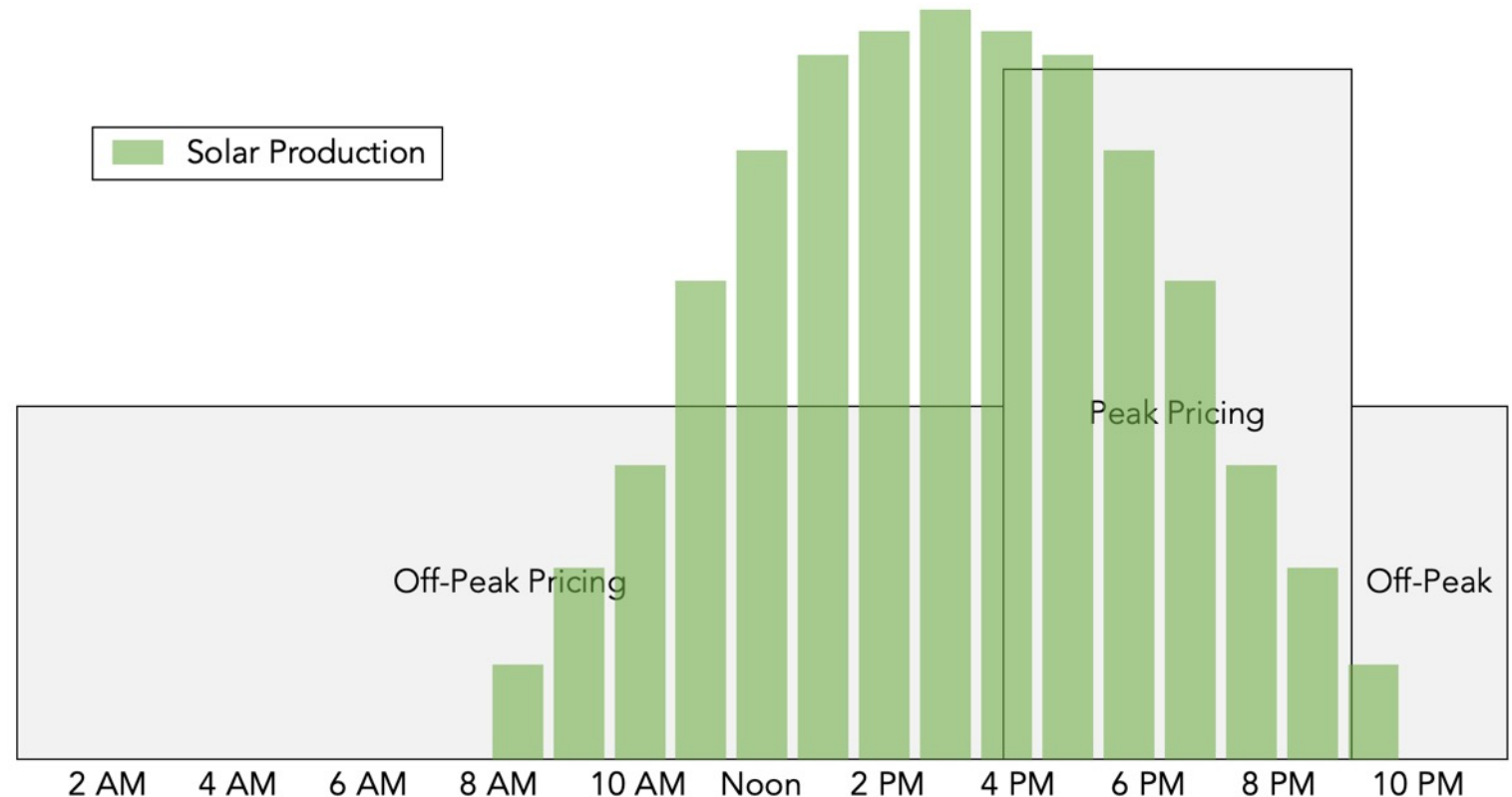


SOLAR CHALLENGES THAT PUBLIC AGENCIES ARE FACING

Retail Rate Changes

The time-of-use peak pricing (for electric utility rates) has moved from the middle of the day to the evening, reducing the bill savings opportunity of solar. For one agency, this time-of-use peak period shift resulted in a **\$400k annual reduction in savings** from their solar.

New Time-Of-Use Peak Periods & Solar Production





CHALLENGES FOR AGENCIES THAT OWN THEIR SOLAR

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SOLAR CHALLENGES THAT PUBLIC AGENCIES ARE FACING

Equipment Failures

As these systems continue to age, capital investments are needed to replace aging inverters and position these systems for strong performance over their remaining useful life.

Solar Equipment Expected Useful Life

Solar
Panels

25 – 30 Years

Inverters

10 – 15 Years



CHALLENGES FOR AGENCIES THAT HAVE SOLAR PPAs

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SOLAR CHALLENGES THAT PUBLIC AGENCIES ARE FACING

Escalating Solar Agreement Prices

The terms of many early PPAs started with high solar payment rates, as well as rate escalators that increased the solar costs each year. Over time (in some cases), the solar payment rate surpasses the retail rates offered by the electric utility.

Case Study: Public Agency PG&E Customer

Solar Portfolio	471 kW, 6 sites
Financing	20-year Power Purchase Agreements
Initial PPA Rate	\$0.219 - \$0.239
Rate Escalator	4.49% per year

Expected Outcome Thru Remaining Term

Utility Bill Savings	\$1,573,183
PPA Payments & Asset Management	(\$1,838,328)
Net Financial Outcome	(\$265,145)

CASE STUDIES IN ADDRESSING SOLAR CHALLENGES

TerraVerde recently supported one of our clients in buying out their solar PPA

BEFORE

Water Agency, SCE Customer
5 MW RES-BCT Project, 20-Year PPA
PPA Rate: \$0.11 / kWh, 2% Escalator

Expected Outcome Thru Remaining Term

Utility Bill Savings	\$11.6 million
PPA Payments & Asset Management	(\$30.9 million)
Net Financial Outcome	(\$19.3 million)

AFTER

Negotiating A Buyout Leveraging Available Capital
Monetizing Renewable Energy Certificates
Increase Production by Re-powering the Systems

Expected Outcome Thru Remaining Term

Increased Utility Bill Savings	\$12.3 million
Renewable Energy Certificate Revenue	\$2.1 Million
Net Financial Outcome	7.88% IRR

CASE STUDIES IN ADDRESSING SOLAR CHALLENGES

As highlighted in the case study below, we are supporting several of our clients in evaluating their opportunity to refinance their solar PPAs.

BEFORE

School, PG&E Customer

400 kW Solar Project, 15-Year PPA

PPA Rate: \$0.15 / kWh, 3.75% Escalator

Expected Outcome Thru Remaining Term

Utility Bill Savings	\$235,432
PPA Payments	(\$418,080)
Net Financial Outcome	(\$182,648)

AFTER

Refinancing the PPA

\$0.04 rate discount, 1.75% escalator discount

20-year term length extension, addition of batteries

New Expected Outcome

Utility Bill Savings	\$3,584,997
New PPA Payments	(\$2,927,358)
Net Financial Outcome	\$657,639

ACTIONS FOR YOUR CONSIDERATION

FOR ALL AGENCIES THAT HAVE SOLAR

- Ensure your systems are being monitored & maintained properly to optimize energy output
 - Assess annual savings & expected financial impacts of the TOU shift
 - Explore the opportunities to monetize RECs
- Evaluate the potential resiliency and savings benefits of adding battery storage

FOR AGENCIES THAT OWN THEIR SOLAR

- Establish plans for inverter replacements

FOR AGENCIES THAT HAVE SOLAR PPAs

- Consider PPA buy out and/or refinancing

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Upcoming Events

WEEK 3



12th Annual California Climate & Energy Forum

Transforming Tomorrow Together

August 3 - 19, 2021

Post-Session Survey:

bit.ly/CCEC-Post-Session-Survey

- **8/19 Closing Plenary:**
Highlights and Horizons: An Interactive Forum Closing

To view the entire program visit eecoordinator.info/forum-program/