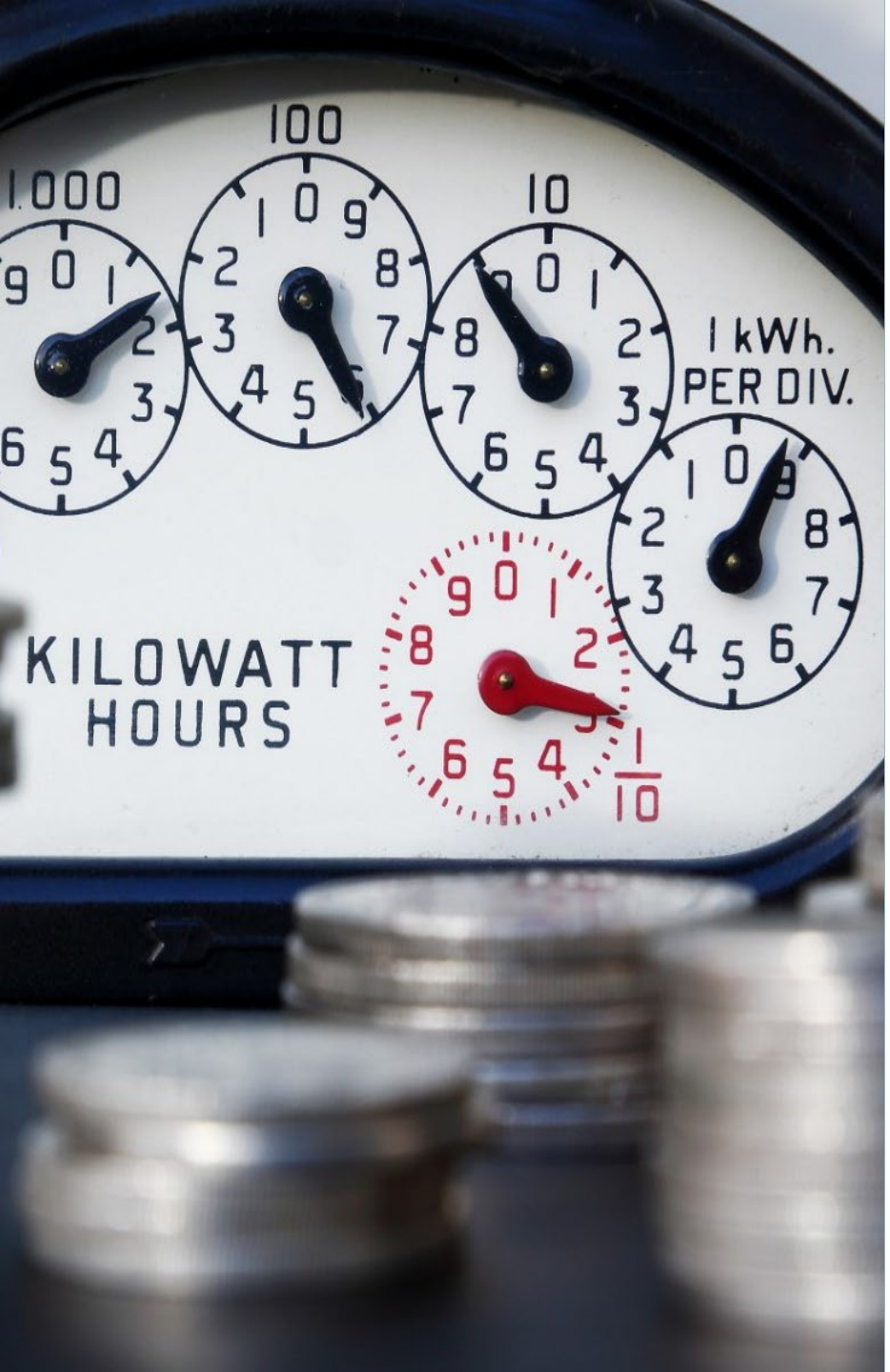


energy toolbase

What Will NEM-3 Mean for Commercial Solar + Storage Projects in California

WEDNESDAY, OCTOBER 13, 2021

Webinar Presenters

Brad Heavner
Policy Director
CALSSA

Erin Christensen
Technical Content Specialist
Energy Toolbase

Adam Gerza
VP Business Development
Energy Toolbase

NEM-2 Grandfathering

- Final language is still being concluded.
- Based on D.16-01-044, it can be expected that customers that secure NEM-2 status will be protected for 20 years.
- Likely that the interconnection application submittal date will be used in determining eligibility.
- For non-residential customers, applications can be submitted before installation but must contain a nearly final system design.
- Due to current uncertainties, customers should aim to have applications submitted prior to January 2022.
- ETB blog: The Transition from NEM-2 to NEM-3 in California is on the Horizon – What you Need to Know about Grandfathering Protections

Glidepath Proposals

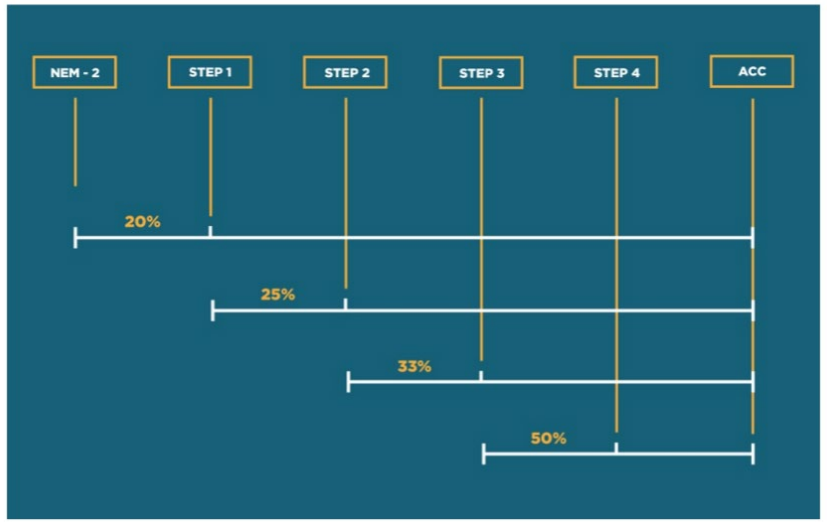
Table 5: *Stepdown Schedule for Export Rates*

Step	Export Percentage		Cumulative MW at the End of Each Step			*Expected Year for Each Step*
	PG&E and SDG&E	SCE	PG&E	SCE	SDG&E	
1	Electrification rate	Electrification rate	375	260	145	*2023*
2	95%	95%	750	520	290	*2024*
3	85%	90%	1,125	780	435	*2025*
4	70%	85%	1,500	1,040	580	*2026*
5	50%	75%	1,875	1,300	625	*2027*

Table 1. NEM Export Value as Percentage Reduction from Retail Rates

	Export Step-Down							
	PG&E		SCE		SDG&E		All IOUs	
	Solar	Solar + Storage	Solar	Solar + Storage	Solar	Solar + Storage	CARE/ FERA	LMI Multifamily Renters
Step 1	90%	100%	95%	100%	90%	95%	100%	100%
Step 2	80%	95%	90%	100%	80%	90%	100%	100%
Step 3	70%	90%	85%	100%	70%	85%	100%	100%
Step 4	60%	85%	80%	100%	60%	75%	100%	100%
Step 5	50%	80%	75%	100%	45%	65%	100%	100%

Figure 11. Illustrative Glidepath for Reduction in NEM Export Value



The IOUs Propose a "Reform Tariff"

- PG&E, SCE, and SDG&E jointly submitted a proposal for a "Reform Tariff".
- The Reform Tariff includes an Export Compensation Rate (ECR), instantaneous time-of-use netting with monthly true-ups, and a fixed "Grid Benefits Charge".
- The ECR would be based on the Avoided Cost Calculator (ACC), using a one-year forward estimate and time-of-export periods.
- Export rates would be capped to not exceed each respective IOU's volumetric commodity rate.
- ECR would be fluid, changing based on modifications made to the ACC.
- No glidepath, prompt transition after CPUC issues their Final Decision.

Grid Benefits Charge (GBC)

Class	Utility	Rate	Current Customer Charge ($/mo)	Proposed "Grid Benefits Charge" ($/kW/mo)	Typical System Size (kW)	Total Monthly Fixed Charge
Small Commercial	PG&E	B-1	$25	$20.84	50	$1,067
	SCE	TOU-GS-1	$18	$9.75		$506
	SDG&E	DG-R	$186	$17.36		$1,054
Medium Commercial	PG&E	B-10	$168	$12.52	250	$3,298
	SCE	TOU-GS-2	$194	$8.29		$2,267
	SDG&E	DG-R	$186	$17.36		$4,526
Large Commercial	PG&E	B-19R	$847	$8.68	750	$7,357
	SCE	TOU-8 (2 kV)	$701	$7.24		$6,131
	SDG&E	DG-R (>500 kW)	$745	$17.36		$13,765

Navigating - Avoided Cost Calculator (ACC) Excel workbook

- Download '2021 ACC Electric Model v1b.xlsb'
- Change inputs under 'Dashboard Viewer' tab.
- Look at Total Levelized Value column – displays 8760 hourly results.
- The ACC undergoes annual modifications.

Control Panel 2021 ACC Electric model v1b	
Utility	PG&E
Climate Zone	CZ16
CAISO Market	NP15
Start year	2022
Levelization Period (yrs)	1
(Enter 1 yr to show single year results)	
Incl Reserve Margin =1	1
WACC for levelized results	7.68%
Components to Include	
Cap and Trade	TRUE
GHG Adder	TRUE
GHG Rebalancing	TRUE
Energy	TRUE
Generation Capacity	TRUE
Transmission Capacity	TRUE
Distribution Capacity	TRUE
Ancillary Services	TRUE
Losses	TRUE
Methane Leakage	TRUE

Options	Location	Comment
Utility	G3	PG&E, SCE, or SDG&E
Climate Zone	G4	Indicates the climate zone to use for T&D allocation factors and, for PG&E, area-specific T&D $/kW-yr capacity costs.
Incl Reserve Margin = 1	G5	(1 or 0). A value of 1 adds the value of reducing the reserve margin needs to the value of capacity reductions. This is appropriate for demand-side resources. A value of 0 should be entered if the avoided costs are to be used for supply-side resources, which would not reduce the reserve margin requirements.
Start Year	G6	(2017 – 2042, integer values) Note that the ACC only contains avoided costs through 2047, so the combination of this entry and the Levelization Period should not exceed 2047.
Levelization Period (yrs)	G7	(1 – 30, integer values) The model reports hourly costs on the dashboard. The costs can be for a single year (levelization period = 1), or for up to 30 years. The levelization is constant in real dollars.
Electricity Components	G11:G16	(TRUE, FALSE) Indicates which components to include in the avoided costs. Note that Losses are energy-related losses and are included or excluded based on the selection for Energy. Capacity-related losses are incorporated into the respective capacity avoided costs, and not reported separately.
Three-day shapshot Month(1-12)	G18	The Dashboard can graph the component avoided costs for any continuous three-day period. This is the month for the first day in that period.
Starting Day	G19	(1-31). This is the day of the month for the start of the three-day period.

Hourly Levelized Value of Electricity ($/MWh)

Date/Time Stamp	Cap and Trade	GHG Adder	GHG Rebalancing	Energy	Generation Capacity	Transmission Capacity	Distribution Capacity	Ancillary Services	Losses	Methane Leakage	Total Levelized Value
Jan-01 00:00	$4.75	$10.13	-$9.46	$25.30	$0.00	$0.00	$0.00	$0.49	$1.83	$0.30	$33.34
Jan-01 01:00	$7.51	$16.01	-$9.46	$39.84	$0.00	$0.00	$0.00	$0.77	$2.88	$0.78	$58.34
Jan-01 02:00	$5.15	$10.98	-$9.46	$27.41	$0.00	$0.00	$0.00	$0.53	$1.98	$0.37	$36.96
Jan-01 03:00	$4.75	$10.13	-$9.46	$25.30	$0.00	$0.00	$0.00	$0.49	$1.83	$0.30	$33.34
Jan-01 04:00	$7.79	$16.60	-$9.46	$41.30	$0.00	$0.00	$0.00	$0.80	$2.99	$0.83	$60.85
Jan-01 05:00	$6.77	$14.43	-$9.46	$35.93	$0.00	$0.00	$0.00	$0.70	$2.60	$0.65	$51.62
Jan-01 06:00	$5.75	$12.26	-$9.46	$30.57	$0.00	$0.00	$0.00	$0.59	$2.21	$0.48	$42.40
Jan-01 07:00	$5.75	$12.26	-$9.46	$30.57	$0.00	$0.00	$0.00	$0.59	$2.21	$0.48	$42.40
Jan-01 08:00	$5.75	$12.26	-$9.46	$30.57	$0.00	$0.00	$0.00	$0.59	$2.21	$0.48	$42.40
Jan-01 09:00	$4.75	$10.13	-$9.46	$25.30	$0.00	$0.00	$0.00	$0.49	$1.83	$0.30	$33.34

2022 ACC Averages (1-year levelization period)

Pacific Gas & Electric			
	Summer (Jun-Sep)	Winter (Oct-Feb)	Winter (Mar-May)
Peak	0.28	0.08	0.08
Part Peak	0.09	-	-
Off Peak	0.04	0.05	0.02
Super Off Peak	-	-	0.02

San Diego Gas & Electric			
	Summer (Jun-Oct)	Winter (Mar-Apr)	Winter (Nov-Feb & May)
On Peak	0.23	0.10	0.09
Off Peak	0.06	0.03	0.04
Super Off Peak	0.04	0.02	0.04

Southern California Edison		
	Summer (Jun-Sep)	Winter (Oct-May)
On Peak	0.22	-
Mid Peak	0.37	0.10
Off Peak	0.06	0.04
Super Off Peak	-	0.04

SUMMER (Service from June 1 through September 30):		
Peak:	4:00 p.m. to 9:00 p.m.	Every day, including weekends and holidays
Partial-peak:	2:00 p.m. to 4:00 pm AND 9:00 p.m. to 11:00 p.m.	Every day, including weekends and holidays
Off-peak:	All other Hours.	
WINTER (Service from October 1 through May 31):		
Peak:	4:00 p.m. to 9:00 p.m.	Every day, including weekends and holidays
Super Off-Peak	9:00 a.m. to 2:00 p.m.	Every day in March, April and May, including weekends and holidays
Off-peak:	All other Hours.	

TOU Period – Weekdays	Summer	Winter
On-Peak	4:00 p.m. – 9:00 p.m.	4:00 p.m. – 9:00 p.m.
Off-Peak	6:00 a.m. – 4:00 p.m.; 9:00 p.m. – midnight	6:00 a.m. – 4:00 p.m. Excluding 10:00 a.m.–2:00 p.m.in March and April; 9:00 p.m. - midnight
Super-Off-Peak	Midnight – 6:00 a.m.	Midnight – 6:00 a.m. 10:00 a.m. – 2:00 p.m. in March and April

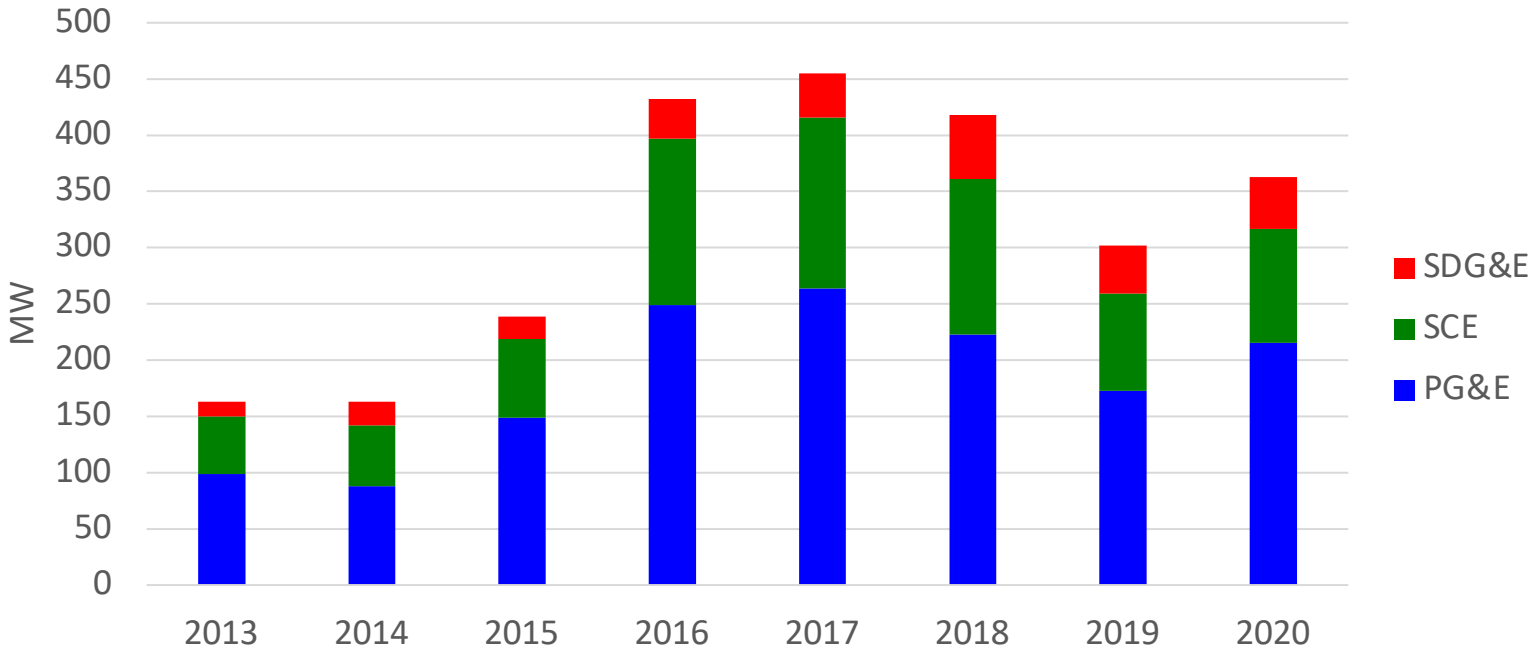
TOU Period – Weekends and Holidays	Summer	Winter
On-Peak	4:00 p.m. – 9:00 p.m.	4:00 p.m. – 9:00 p.m.
Off-Peak	2:00 p.m. – 4:00 p.m.; 9:00 p.m. – midnight	2:00 p.m. – 4:00 p.m. 9:00 p.m. - midnight
Super-Off-Peak	Midnight – 2:00 p.m.	Midnight – 2:00 p.m.

TOU Period	Weekdays		Weekends and Holidays	
	Summer	Winter	Summer	Winter
On-Peak	4 p.m. - 9 p.m.	N/A	N/A	N/A
Mid-Peak	N/A	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.
Off-Peak	All other hours	9 p.m. - 8 a.m.	All other hours	9 p.m. - 8 a.m.
Super-Off-Peak	N/A	8 a.m. - 4 p.m.	N/A	8 a.m. - 4 p.m.
CPP Event Period	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.	N/A	N/A

NEM-3 Proceeding at the CPUC

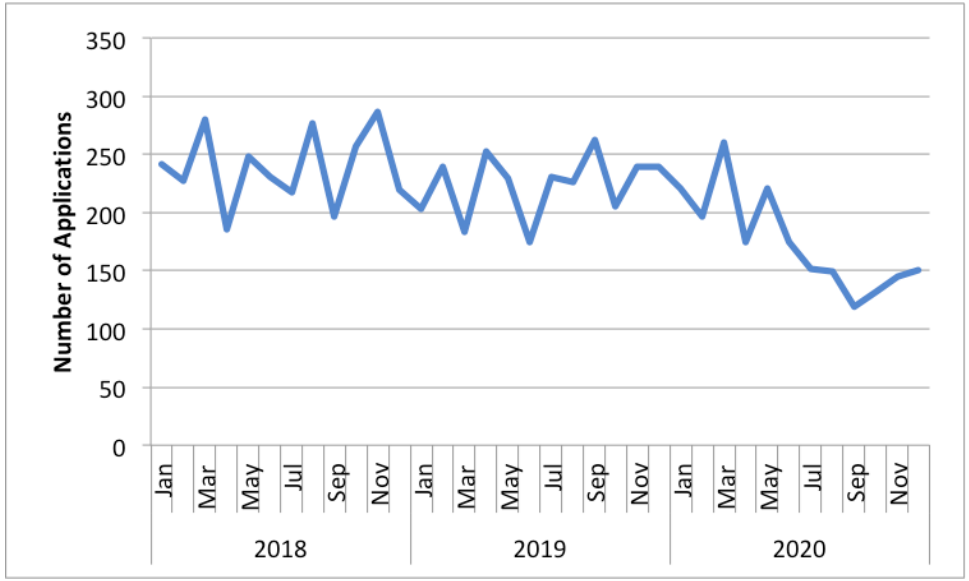
CALIFORNIA SOLAR + STORAGE ASSOCIATION
smart local energy

Commercial Solar Interconnections

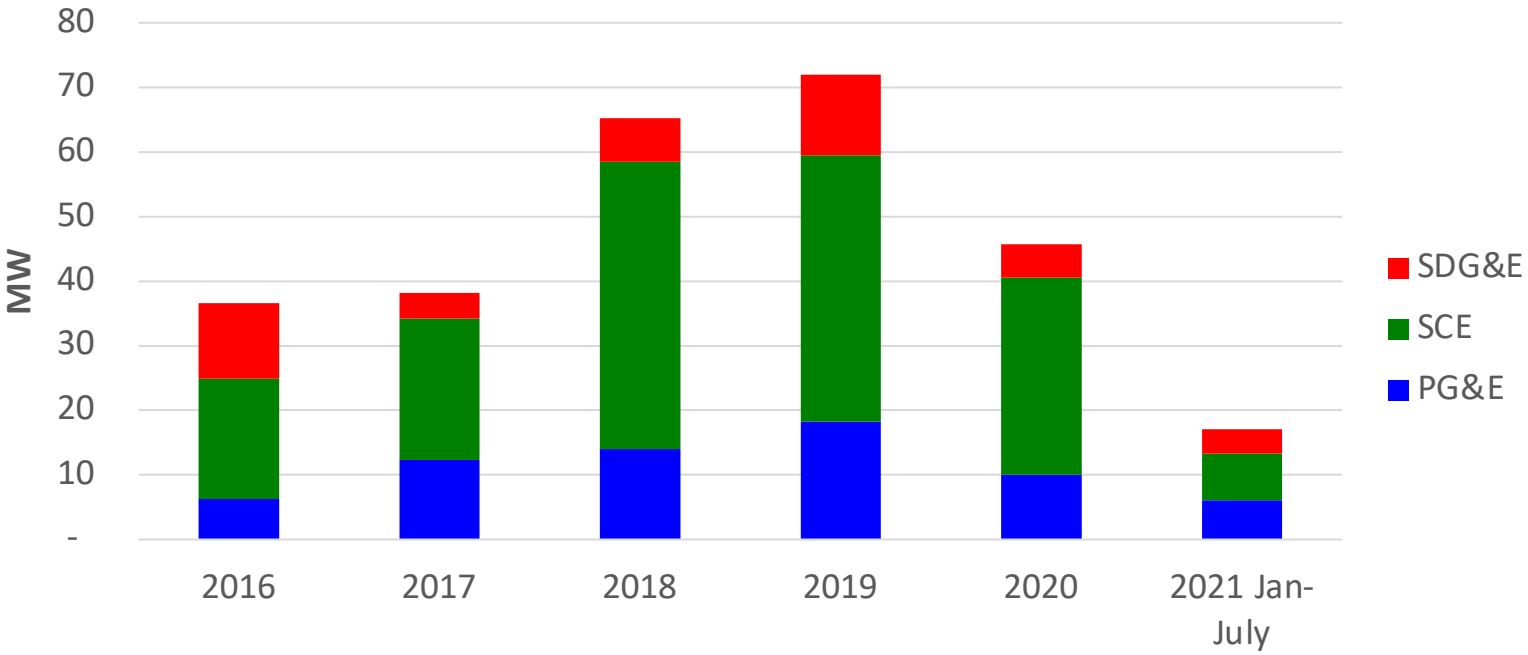


CALIFORNIA SOLAR + STORAGE ASSOCIATION

Commercial Solar Interconnection Applications

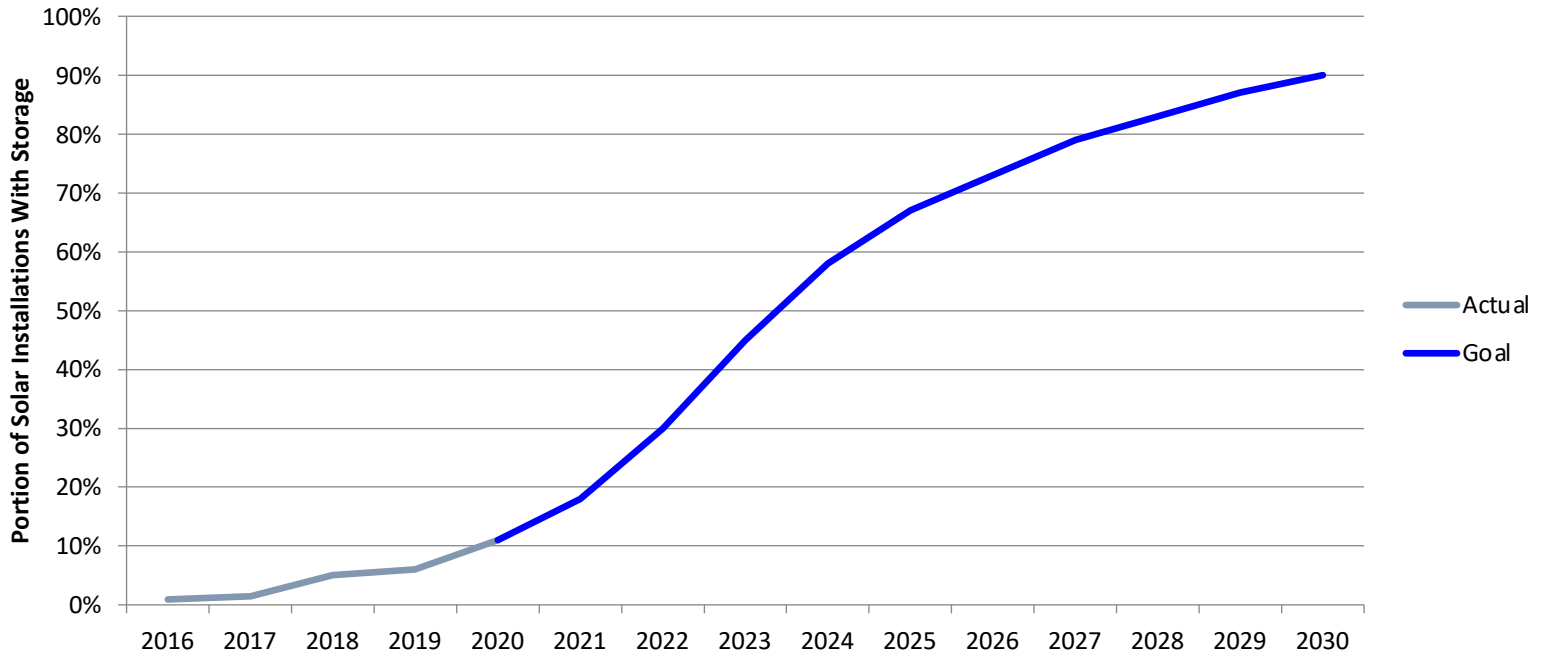


Commercial Storage Interconnections



CALIFORNIA SOLAR + STORAGE ASSOCIATION

Storage Attachment Rate



CALIFORNIA SOLAR + STORAGE ASSOCIATION

Solar Opposition

PG&E

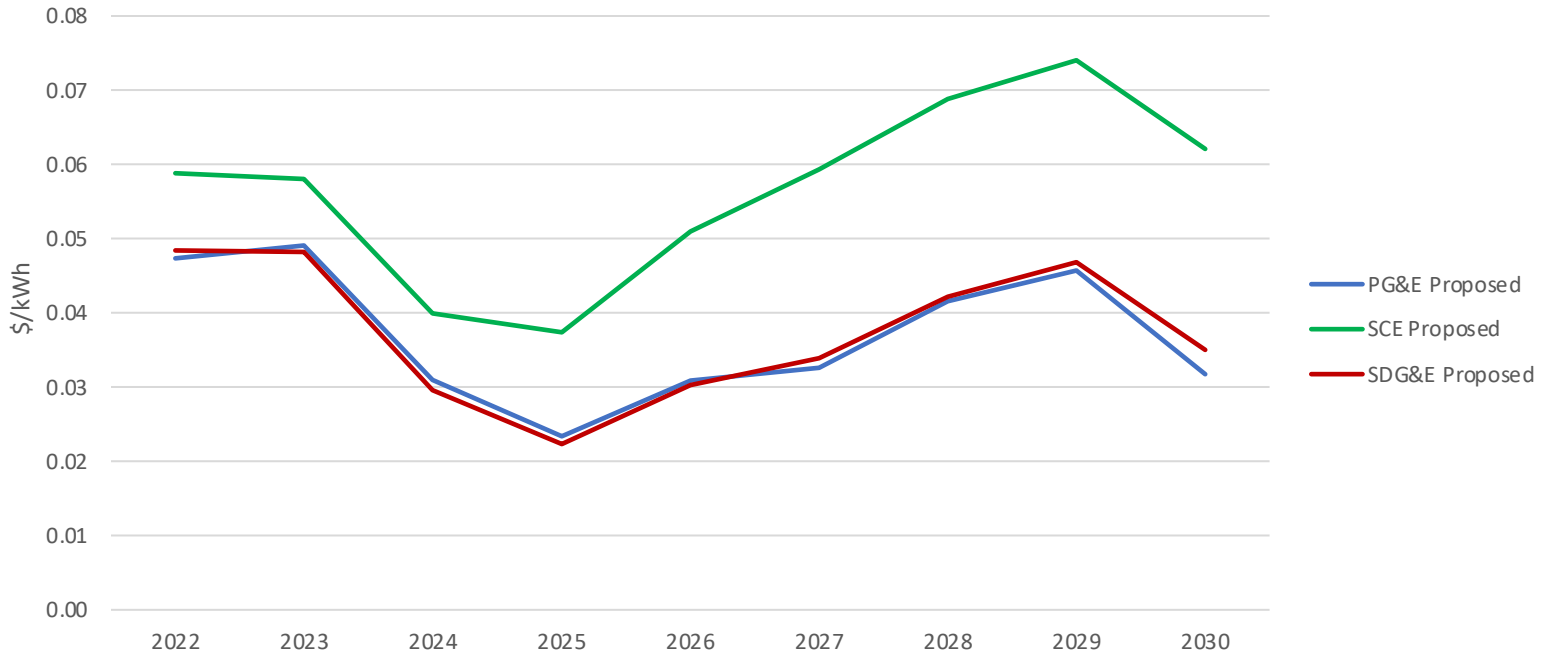
SOUTHERN CALIFORNIA EDISON

SDGE

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS · ORGANIZED NOV. 28, 1891

NRDC
NATURAL RESOURCES DEFENSE COUNCIL

Proposed NEM-3 Export Compensation



CALIFORNIA SOLAR + STORAGE ASSOCIATION

Proposed Commercial Solar Fees

Class	Utility	Current Fixed Charge ($/mo)	Proposed Solar Fee ($/kW/mo)	Typical System Size (kW)	Proposed New Monthly Fee
Small Commercial	PG&E	$ 25	$ 17.91		$ 896
	SCE	$ 15	$ 8.38	50	$ 419
	SDG&E	$ 16	$ 18.34		$ 917
Medium Commercial	PG&E	$ 167	$ 10.76		$ 2,690
	SCE	$ 159	$ 7.12	250	$ 1,780
	SDG&E	$ 186	$ 14.92		$ 3,730
Large Commercial	PG&E	$ 839	$ 7.46		$ 5,595
	SCE	$ 572	$ 6.22	750	$ 4,665
	SDG&E	$ 745	$ 14.92		$ 11,190
Small Agricultural	PG&E	$ 21	$ 10.43		$ 417
	SCE	$ 56	$ 4.56	40	$ 182
	SDG&E	$ 22	$ 19.68		$ 787
Large Agricultural	PG&E	$ 44	$ 9.61		$ 4,805
	SCE	$ 281	$ 2.34	500	$ 1,170
	SDG&E	$ 106	$ 3.05		$ 1,525

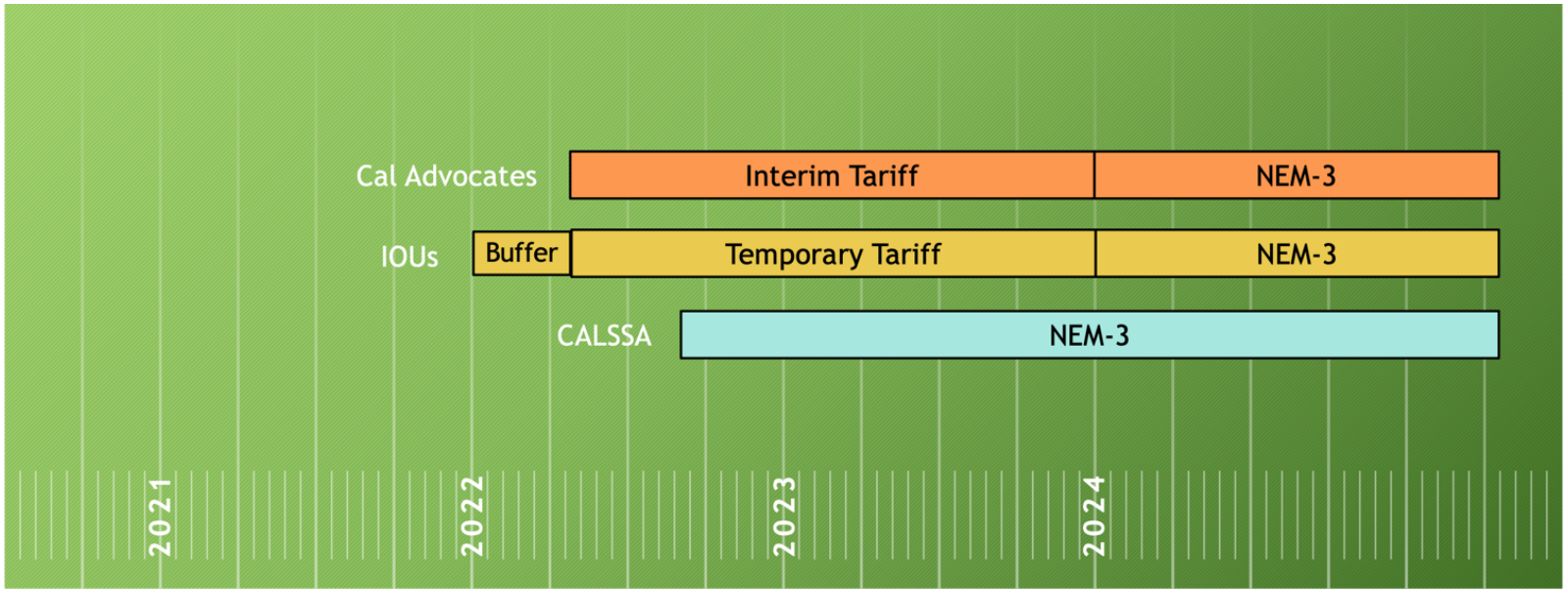
CALIFORNIA SOLAR + STORAGE ASSOCIATION

Simple Payback Periods for Solar Under NEM-3 Proposals

	Utility	Current Payback Period (years)	Utility Proposed NEM-3 Payback (26% ITC)	Utility Proposed NEM-3 Payback (0-10% ITC)
Residential (6kW system)	PG&E	6.0	20.5	28.8
	SCE	7.2	19.5	27.7
	SDG&E	5.1	12.4	16.5
Commercial (250kW system)	PG&E	6.3	14.2	18.9
	SCE	6.4	14.5	19.9
	SDG&E	4.4	21.4	29.3

CALIFORNIA SOLAR + STORAGE ASSOCIATION

NEM-3 Implementation Timeline



CALIFORNIA SOLAR + STORAGE ASSOCIATION

Potential NEM 2.5

For customers installing between approximately May 2022 and December 2023

- Residential customers must be on an electrification rate
  - EV-2, TOU-PRIME, EV-TOU-5
- NEM credits reduced by 34%-85%
- Eligibility period reduced to 10-15 years

Benefits of CALSSA Membership

- Get in the loop on the policy changes that impact your bottom line
- Fund our work to protect your business
- Access to our policy experts for one-on-one support for your questions issues like SGIP, fire code, interconnection, and NEM 3
- Project-level support to help when your projects hit snags on interconnection or permitting
- For more information contact our Membership Director Carter Lavin carter@calssa.org or call/text him at (610) 772-6591
- ***Membership is half off in October when you sign up with discount code "ELN50" or "BayWa" thanks to donations from Energy Loan Network and BayWa***

CALIFORNIA SOLAR + STORAGE ASSOCIATION

Thank You!

Brad Heavner, Policy Director, brad@calssa.org
Carter Lavin, Membership Director, carter@calssa.org

CALIFORNIA SOLAR + STORAGE ASSOCIATION

How much are PV exports worth on average?

Energy Export After PV/ESS (kWh)			
On Peak	Part Peak	Off Peak	Super Off Peak
47	-	13,456	-
247	-	13,845	-
1,477	-	4,750	12,324
4,371	-	11,037	22,796
5,586	-	11,921	25,112
4,393	9,880	23,079	-
3,386	8,536	19,530	-
2,976	8,086	18,475	-
3,151	9,047	21,164	-
1,468	-	21,417	-
3	-	17,299	-
2	-	13,442	-
27,107	35,549	189,415	60,232

-->

Pacific Gas & Electric			
	Summer (Jun-Sep)	Winter (Oct-Feb)	Winter (Mar-May)
Peak	0.28	0.08	0.08
Part Peak	0.09	-	-
Off Peak	0.04	0.05	0.02
Super Off Peak	-	-	0.02

= $0.055/kWh

NEM-2 vs NEM-3 comparison, Community Center 100% offset

NEM-3 run assumptions:

- PG&E, B-10 | 2022 ACC values
- PV system sized to offset 100% of annual consumption
- 51% of PV reduces imports ($0.183/kWh value)
- 49% of PV exports to grid ($0.055/kWh value)
- $10.76/kW DC PV – Grid Benefits Charge

	NEM-2	NEM-3 (exports @ 2022 ACC)
Avg blended value of PV ($/kWh)	$0.179	$0.133

NEM-2		NEM-3 (exports @ 2022 ACC)		NEM-3 (exports @ 2022 ACC + GBC)	
Payback (yrs)	6.3	Payback (yrs)	8.3	Payback (yrs)	> 25
IRR (25-yr)	13.5%	IRR (25-yr)	10.1%	IRR (25-yr)	-0.3%

NEM-2 vs NEM-3 comparison, Community Center 50% offset

NEM-3 run assumptions:

- PG&E, B-10 | 2022 ACC values
- PV system sized to offset 50% of annual consumption
- 83% of PV reduces imports ($0.18/kWh value)
- 17% of PV exports to grid ($0.041/kWh value)
- $10.76/kW DC PV – Grid Benefits Charge

	NEM-2	NEM-3 (exports @ 2022 ACC)
Avg blended value of PV ($/kWh)	$0.198	$0.182
Avg blended value of PV "Energy" savings ($/kWh)	$0.172	$0.156

NEM-2		NEM-3 (exports @ 2022 ACC)		NEM-3 (exports @ 2022 ACC + GBC)	
Payback (yrs)	5.8	Payback (yrs)	6.2	Payback (yrs)	14.5
IRR (25-yr)	14.9%	IRR (25-yr)	13.7%	IRR (25-yr)	5.3%

energy toolbase

PV+ESS Economics: NEM-2 vs NEM-3, Church 100% Offset

NEM-3 run assumptions:

- SDG&E, DG-R
- PV system sized to offset 100% of annual consumption
- 42% of PV reduces imports ($0.244/kWh value)
- 58% of PV exports to grid ($0.062/kWh value)
- $14.92/kW DC PV – Grid Benefits Charge

	NEM-2	NEM-3 (exports @ 2022 ACC)
Avg blended value of PV ($/kWh)	$0.262	$0.175
ESS Savings ($/kWh of ESS Capacity)	$85	$137

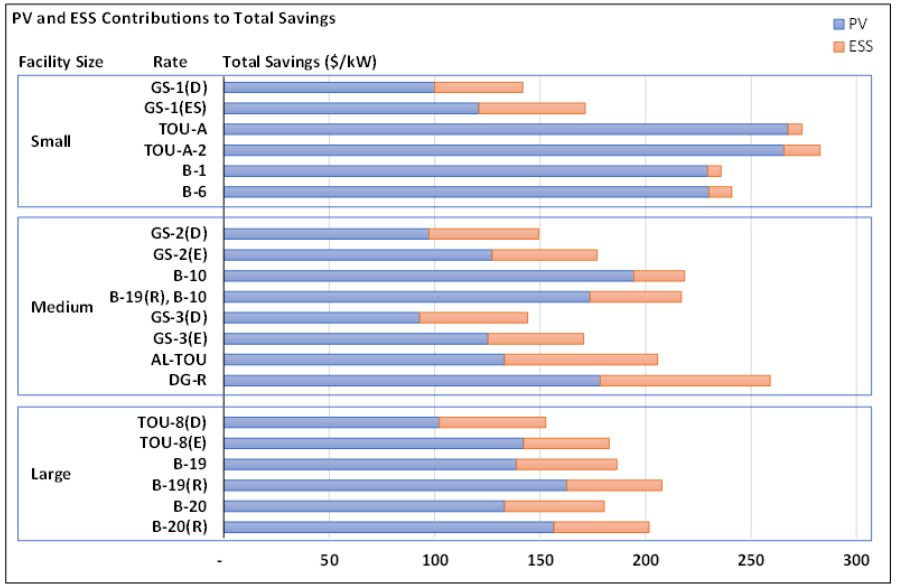
NEM-2		NEM-3 (exports @ 2022 ACC)		NEM-3 (exports @ 2022 ACC + GBC)	
Payback (yrs)	4.7	Payback (yrs)	5.2	Payback (yrs)	9.6
IRR (25-yr)	17.8%	IRR (25-yr)	15.9%	IRR (25-yr)	8.9%

energy toolbase

ESS will Capture a Larger Percentage of Savings in a NEM-3 world

Link > ETB Masterclass: Optimizing the economics of C&I Solar + Storage projects in California

There is a wide variance in how much PV & ESS contributes to savings, depending on the rate



*** Disclaimer: obviously highly dependent on PV & ESS relatives system sizes*

Wide variance:

Avg: 78% PV / 22% ESS

Min: 64% PV / 36% ESS

Max: 98% PV / 2% ESS

Key takeaway:

Some rates offer strong incremental savings opportunities for adding ESS. Some are weak.

energy toolbase

18

energy toolbase

Key takeaways

1. Value of PV will get eroded in NEM-3 as a result of reduced export values
   - How much depends on how much PV exports to grid
   - Majority of exports are “off-peak” or “super-off-peak”, which are valued low
2. Reduced export values will hurt. +GBC would absolutely decimate economics.
3. ESS savings will improve in NEM-3 because of strong self-consumption price signal.
   - NEM-3 C&I ESS = Demand Charge Management + TOU Arbitrage + Self-consumption
   - NEM-3: the ratio of ESS savings relative to PV savings will go up
4. Developers should use looming NEM-3 transition to their advantage. Create urgency to go PV+ESS now and not miss the cutoff date
   - We expect a big surge of projects when the NEM-3 deadline gets near
   - In a NEM-3 world we expect the PV+ESS “attachment rate” to go up significantly

From Project Conception through End of Life

Our team and suite of products takes you through every step of your project's lifecycle

Pre-Install

Post-Install

MODEL THE SITE

ETB Developer

Gold standard, industry leading software platform for modeling and proposing the economics of solar and storage projects.

CONTROL THE ASSETS

Acumen EMS™

Intelligent control system software utilizing machine learning and AI to forecast and optimally discharge energy storage systems.

MONITOR THE PERFORMANCE

ETB Monitor

Robust monitoring platform providing complete transparency into the real-time operation and performance of solar + storage systems.

energy toolbase

Q&A

Brad Heavner
Policy Director
CALSSA

Erin Christensen
Technical Content Specialist
Energy Toolbase

Adam Gerza
VP Business Development
Energy Toolbase

THANK YOU!