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California Solar Net Energy Metering: Damaging in the Near Term, but Storage Offers Long-Term Offset

The CA regulator's proposed solar net metering rules, with a large grid access fee and a low power export rate, would in our view be heavily damaging to near-term rooftop solar growth and margins, but storage can provide a longer-term offset. We are reviewing our PTs for RUN and SPWR.

Key takeaways: **(1)** the California Public Utilities Commission (CPUC) Proposed Decision (PD) on solar net metering included a surprisingly high grid access fee for new rooftop solar customers, which would, in our view, largely to completely eliminate the economic benefits of rooftop solar in California, absent the inclusion of storage (and CA is ~50% of RUN's and SPWR's growth, so this is clearly a meaningful near-term impact to both companies), **(2)** however, with the inclusion of energy storage with rooftop solar, we project that, given rising utility bills, solar + storage will offer California residential customers savings relative to the utility bill, **(3)** for RUN, the company's storage offering is growing rapidly (100% per year), and we project that by 2024, the company will have sufficient storage volumes to offer all prospective California customers the ability to include storage with solar (which together provide net savings versus the utility bill), **(4)** we are reviewing our PTs for RUN and SPWR given the potential near-term magnitude of impact from this proposed decision (see our preliminary assessment below, which would result in a \$1-4 PT impact for RUN and \$.50-.75/share for SPWR), **(5)** there is in our view some potential for this Proposed Decision to be modified, given the decision could completely halt the growth of rooftop solar (absent a storage addition) in California, but it is challenging to determine the probability of such a change, and **(6)** we have provided a quantification of the potential impacts to RUN to put this issue in context of what is already priced into the stock - and the impacts in the longer-term are less severe than appreciated because of the benefits of deploying energy storage with solar.

Yesterday, the California Public Utilities Commission (CPUC) issued a Proposed Decision (PD) on solar Net Energy Metering 3.0 (NEM 3.0). Key elements of the proposed decision are below, and in the second section of this note, we quantify the potential impacts to rooftop solar players such as RUN and SPWR. **The key takeaway from our analyses:** this NEM 3.0 PD would largely eliminate the economic benefit of deploying rooftop solar, but the addition of energy storage

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would result in a net savings to utility customers. We continue to see a benefit when customers choose rooftop solar + storage in California, and that trend will continue as utility bills continue to rise and as the costs of rooftop solar companies continue to fall. Based on our math, solar-only systems will struggle to be economic in the state, which ties future growth in the state to battery availability, which skews more positively to the larger installers who have greater access to battery supply.

Putting this issue in the context of RUN's current stock price. Sunrun's current equity market capitalization is ~\$8.7b, and our conservative estimate of the net value of current customers is \$3.8b (the company's analysis shows a value of \$4.6b). Therefore, ~\$4.9b of Sunrun's market value is associated with future customer growth. In 2022, our current model forecast is for total customer value creation to be \$880m, and we project customer growth through 2025 of 20% per year. In terms of storage growth relative to Sunrun's California customer growth, we project that in 2022, Sunrun will deploy ~28,000 storage systems (growth per year is 100%, and is only limited by battery availability), while we project that California customer growth in 2022 would total ~65,000 (half the total growth). Therefore, if all storage volumes are directed towards the California market (which might be challenging to achieve given demand in other markets), by 2023 Sunrun would be able to mostly meet the California market need (56,000 storage systems relative to ~78,000 new California customers in 2023), and by 2024 storage volumes should in our view be sufficient to completely meet California customer demand. *Here is an approximation of the impact to RUN under this approach:* **(A)** in 2022, Sunrun's value creation falls from our projected \$880m by ~12-15% (under the assumption that ~1/4 of new prospective CA customers do not deploy solar because storage is unavailable, and solar alone is not economic relative to the utility bill once NEM 3.0 goes into effect in 2H22), **(B)** in 2023, Sunrun's value creation versus our estimate falls by perhaps ~10-20% given that storage volumes meet the majority of new California solar demand, and **(C)** by 2024, the customer growth and value creation is as per our expectation because storage volumes are sufficient. Therefore, RUN stock would be reflecting ~5 years of growth even after factoring in this California net metering proposed decision. When we factor in growth for Sunrun, we are not factoring in **(A)** the continuing trend of higher utility bills and lower distributed energy costs, **(B)** greater grid instability issues, and **(C)** a large opportunity to "over-size" solar systems to enable EV charging. In summary, we preliminarily estimate this could reduce our RUN price target by \$1-\$4/shr.

For SunPower, assuming a similar dynamic given CA represents ~50% of EBITDA in 2022, we estimate the EBITDA at risk would be ~\$22m in 2022 (16% of consensus levels) and ~\$50m in 2023 (~20% of total EBITDA). The share price impact could range from ~\$0.50-0.75/share (2-3%).

Before we walk through the details of the proposed net energy metering rules in California, we wanted to provide a few key financial metrics to frame the impact to rooftop solar developers and customers: **(A)** a net grid access fee of ~\$50-\$60/month in 2022 ([Exhibit 4](#)) is the typical approximate net savings to rooftop solar customers relative to the utility bill today, but compares to an annual residential utility bill *increase* in our analysis of ~\$25/month, per year in Northern California, for a typical utility customer targeted by Sunrun, **(B)** the

incremental cost of a battery (~\$300/year for a \$7,200 battery financed at 4-5%) is worthwhile for a homeowner to invest in, in order to avoid the low power export rates included in this Proposed Decision (a net revenue reduction to a homeowner of ~\$1,100-1,300/year in our indicative analysis), **(C)** in the longer term, given the magnitude of grid access charges, we may reach a "tipping point" at which California residents might consider disconnecting from the grid (we would point to technology developments at Generac, Enphase and SolarEdge as early data points). For example, avoiding a \$600/year grid access charge would translate to a breakeven point for the equipment needed to enable a customer to disconnect from the grid of ~\$12,000 (using a 5% financing cost for such equipment, which would include a standby power source such as a Generac generator).

Key elements of the Proposed Decision:

1. Very large Grid Participation Charges (essentially a grid access fee for new rooftop solar customers), as shown in the following table, applied only to residential customers. The Grid Participation Charge will be reviewed as part of the five year evaluation of affordability and equity elements of the net billing tariff.

Exhibit 1: Overview of Proposed Grid Participation Charges, Before Considering the Offset from the MTC

Monthly Grid Participation Charge for Net Billing Customers			
Customer Segment	PG&E	SDG&E	SCE
Residential	\$8.00/kW	\$8.00/kW	\$8.00/kW
Low-Income	\$0/kW	\$0/kW	\$0/kW
NonResidential	\$0/kW	\$0/kW	\$0/kW

Source: CPUC, Morgan Stanley Research

2. Market Transition Credits (MTCs), as a glide path, based on a dollar per kilowatt installed amount. This payment to rooftop solar customers is designed to help offset the significant proposed Grid Participation Charge. This Market Transition Credit, as indicated in the table below, will be reviewed during a five-year evaluation of portions of the net billing tariff, conducted by the Commission. The Market Transition Credit will remain constant for a customer for 10 years from the customer's interconnection date. The credit will decrease by 25 percent annually, as measured by the first-year credit rate until the credit reaches zero. The monthly credit will be a discrete line on the customer's utility bill, will apply to all charges, and will apply to future bills until the credit is used. Funding for the credit will be provided by all ratepayers through the Public Purpose Program charge.

Exhibit 2: Market Transition Credits (MTCs), by Service Territory

Adopted Market Transition Credits			
Customer Segment	PG&E	SDG&E	SCE
Residential	\$1.62./kW	\$0/kW	\$3.59/kW
Low-Income	\$4.36/kW	\$0/kW	\$5.25/kW
NonResidential	\$0/kW	\$0/kW	\$0/kW

3. Export Compensation Rates based on hourly Avoided Cost Calculator values averaged across days in a month, differentiated by weekdays and weekends.

For the first five years after system interconnection, export compensation rates will be based on a five-year schedule of values for each hour from the most recent Avoided Cost Calculator, adopted as of January 1 of the calendar year of the customer's interconnection date. Following the five-year lock in rate, export compensation rates will be based on averaged hourly avoided cost values from the most recent Avoided Cost Calculator, adopted as of January 1.

4. Highly differentiated time-of-use rates as provided in the following table.

These rates are available to enrolled customers for a period of five years from the customer's interconnection date. Additional eligible rates may be added by utility request through submittal of a Tier 3 Advice Letter.

Exhibit 3: Time of Use Rates, by Utility

Eligible Time Of Use Rates by Utility			
	PG&E	SDG&E	SCE
Eligible Rate	EV2-A	EV-TOU-5	TOU-D-PRIME

Source: CPUC, Morgan Stanley Research

"No later than 120 days after the adoption of this decision, the Commission will implement a tariff sunset on the prior net energy metering tariff, known as NEM 2.0, after which time, no additional customers will be permitted to take service under the NEM 2.0 tariff. Any delay in Step 3 above, will result in an equal, day-for-day, extension of time in the tariff sunset date. Customers signing contracts after this sunset date will take service and be billed on the NEM 2.0 tariff and transitioned to the net billing tariff, once it is operationalized."

5. The original Net Energy Metering tariff, referred to as NEM 1.0, and its successor, referred to as NEM 2.0, are revised as follows:

"Existing NEM 2.0 tariff customers who voluntarily transfer to the net billing tariff adopted in this decision, within four years from its inception, are eligible to receive a \$0.20 per watt hour storage rebate. The storage rebate is available for a total of four years but will decrease by 25 percent a year over the subsequent four years. Customers are eligible for the storage rebate in the year they transition to the successor tariff."

"Immediate replacement of the 20-year legacy period with a 15-year legacy period for all future NEM 2.0 tariff customers, including residential customers who take service under NEM 2.0 after the adoption of this decision, as well as customers taking control of (i.e., owning, leasing, or paying a power purchase agreement for) a residential system, other than when the subsequent customer is the legal

partner (i.e., spouse or domestic partner) of the original customer."

Exhibit 4: Net Grid Access Charge – Monthly Grid Access Charge less Market Transition Credit

Net Grid Access Charge (\$/month)	2022	2023	2024	2025
PG&E	\$45.94	\$48.85	\$51.77	\$54.68
SCE	\$31.75	\$38.21	\$44.68	\$51.14
SDG&E	\$57.60	\$57.60	\$57.60	\$57.60

Source: CPUC, Morgan Stanley Research estimates, Note: Assumes a 7.2 kW system size

California NEM 3.0 Proposed Decision: Quantifying the Impacts

Below we lay out three scenarios with various customer system designs in PG&E's service territory and estimate the value proposition for customers, assuming the NEM 3.0 proposition decision is adopted as drafted. Our main takeaway is that solar must be paired with a battery storage system in order to achieve ~20% customer cost savings, which we believe is the key threshold required to see strong demand for the product. We also note that the adoption of TOU rates could have an additional adverse impact on the economics for customers, but largely depends on customer use patterns, which are not captured in these scenarios.

Exhibit 5: NEM 3.0 Analysis Assumptions – Non-CARE Customer

Typical California Rooftop Solar Customer

Size of system (kW)	7.2
Annual Solar Output (kWh)	11,500
<i>Capacity factor of solar system</i>	18%
% of Customer Electricity Needs	87%
Total Customer Electricity Usage	13,218
% of Power Sold Back to the Grid	40%
kWh of Power Sold Back to the Grid	4,600
Sunrun price of power to the customer	0.15
Annual Sunrun bill to the solar customer	\$1,725
Annual PG&E bill to the solar customer	\$486
Annual Sunrun + PG&E bill for solar customer	\$2,211
PG&E bill for non-solar customer	\$3,742
Current % bill savings versus PG&E	41%
Sunrun total creation cost/customer	\$ 28,000
Assumed cost if 10 kWh storage is added	\$ 35,200
Resulting Sunrun price with 10 kWh storage	0.19
Assumed cost if 15 kWh storage is added	\$ 37,700
Resulting Sunrun price with 15 kWh storage	0.20
Utility rate for Resi customers (PG&E)	\$ 0.28
<i>PG&E Resi Rate in 2022</i>	\$ 0.31
<i>PG&E Resi Rate in 2023</i>	\$ 0.33
<i>PG&E Resi Rate in 2024</i>	\$ 0.34

Source: Company data, Morgan Stanley Research estimates

In the first scenario (Exhibit 6), we assume the proposed decision is adopted but no storage is included on the system. As a result, we see a significant reduction in the value proposition for customers and believe, at least in the near-term, solar-only will not be an attractive option for customers.

Exhibit 6: Scenario 1: Proposed Decision - Solar Only Customer (Non-CARE)

Scenario 1: Proposed Decision + No Storage	New Customers Added in the Year:		
	2022	2023	2024
Assumed Annual Sunrun cost reduction	0%	5%	5%
PG&E Resi bill per kWh	\$ 0.31	\$ 0.33	\$ 0.34
Sunrun price per kWh, without storage	\$ 0.15	\$ 0.14	\$ 0.14
Net export of power (kWh per year)	4,600	4,600	4,600
Power Export Rate set in NEM 3.0	\$ 0.06	\$ 0.06	\$ 0.06
Annual Increase in bill from lower export rate	\$ 1,143	\$ 1,260	\$ 1,299
Monthly Grid Access Charge (\$/kW)	\$ 8.00	\$ 8.00	\$ 8.00
Market Transition Credit (\$/kW)	\$ 1.62	\$ 1.22	\$ 0.81
Annual Sunrun bill to the customer	\$ 1,725	\$ 1,639	\$ 1,557
Annual PG&E bill to the solar customer	\$ 2,225	\$ 2,421	\$ 2,508
Annual Sunrun + PG&E bill for solar customer	\$ 3,950	\$ 4,059	\$ 4,065
PG&E bill for non-solar customer	\$ 4,079	\$ 4,415	\$ 4,525
% bill savings relative to PG&E bill	3%	8%	10%

Source: CPUC, Company data, Morgan Stanley Research estimates

In the second scenario (Exhibit 7), we assume the customer adds solar and a 10 kWh storage system. With this configuration, we estimate cost savings ranging from 12% in 2022 to 22% by 2024, which is still a significant reduction versus current economics, but would expect continued demand from CA customers.

Exhibit 7: Scenario 2: Proposed Decision – Solar + 10 kWh Storage (Non-CARE)

Scenario 2: 10 kWh Battery Storage	New Customers Added in the Year:		
	2022	2023	2024
Assumed Annual Sunrun cost reduction	0%	5%	5%
PG&E Resi bill per kWh	\$ 0.31	\$ 0.33	\$ 0.34
Sunrun price per kWh with 10 kWh storage	\$ 0.19	\$ 0.18	\$ 0.17
Utilization rate of storage system	90%	90%	90%
Net export of power (kWh per year)	1,315	1,315	1,315
Power Export Rate set in NEM 3.0	\$ 0.06	\$ 0.06	\$ 0.06
Annual Increase in bill from lower export rate	\$ 327	\$ 360	\$ 371
Monthly Grid Access Charge (\$/kW)	\$ 8.00	\$ 8.00	\$ 8.00
Market Transition Credit (\$/kW)	\$ 1.62	\$ 1.22	\$ 0.81
Annual Sunrun bill to the customer, with storage	\$ 2,169	\$ 2,060	\$ 1,957
Annual PG&E bill to the customer	\$ 1,408	\$ 1,520	\$ 1,581
Annual Sunrun + PG&E bill for solar customer	\$ 3,577	\$ 3,581	\$ 3,538
PG&E bill for non-solar customer	\$ 4,079	\$ 4,415	\$ 4,525
% bill savings relative to PG&E bill	12%	19%	22%

Source: CPUC, Company data, Morgan Stanley Research estimates

In the last scenario (Exhibit 8), we assume a solar panel system is combined with a 15 kWh battery, at which point we would not expect the customer to send any power back to the grid and instead self-consume the power during the evening. With this configuration, we estimate 17% monthly savings in 2022, increasing to 27% by 2024. Again, while this is a significant cut versus the current value proposition, but would expect strong demand for the product as it broadly exceeds the 20% savings threshold. The only caveat and downside risk is that this configuration ties future growth to battery availability, which is an added risk.

Exhibit 8: Scenario 3: Proposed Decision - Solar + 15 kWh Storage (Non-CARE)

Scenario 3: 15 kWh Battery Storage	New Customers Added in the Year:		
	2022	2023	2024
Assumed Annual Sunrun cost reduction	0%	5%	5%
PG&E Resi bill per kWh	\$ 0.31	\$ 0.33	\$ 0.34
Sunrun price per kWh with 15 kWh storage	\$ 0.20	\$ 0.19	\$ 0.18
Utilization rate of storage system	90%	90%	90%
Net export of power (kWh per year)	-	-	-
Power Export Rate set in NEM 3.0	\$ 0.06	\$ 0.06	\$ 0.06
Annual Increase in bill from lower export rate	\$ -	\$ -	\$ -
Monthly Grid Access Charge	\$ 8.00	\$ 8.00	\$ 8.00
Market Transition Credit (\$/kW)	\$ 1.62	\$ 1.22	\$ 0.81
Annual Sunrun bill to the customer, with storage	\$ 2,323	\$ 2,206	\$ 2,096
Annual PG&E bill to the customer	\$ 1,081	\$ 1,160	\$ 1,209
Annual Sunrun + PG&E bill for solar customer	\$ 3,404	\$ 3,367	\$ 3,306
PG&E bill for non-solar customer	\$ 4,079	\$ 4,415	\$ 4,525
% bill savings relative to PG&E bill	17%	24%	27%

Source: CPUC, Company data, Morgan Stanley Research estimates