Bringing Solar Power to the People: Multi-Year Case Study of a First-in-Time Community Solar Garden

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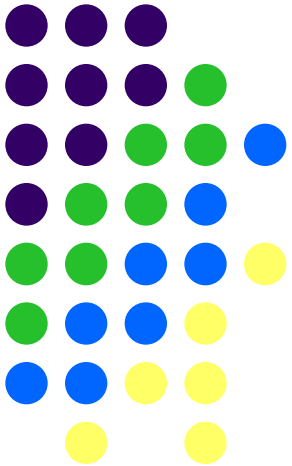


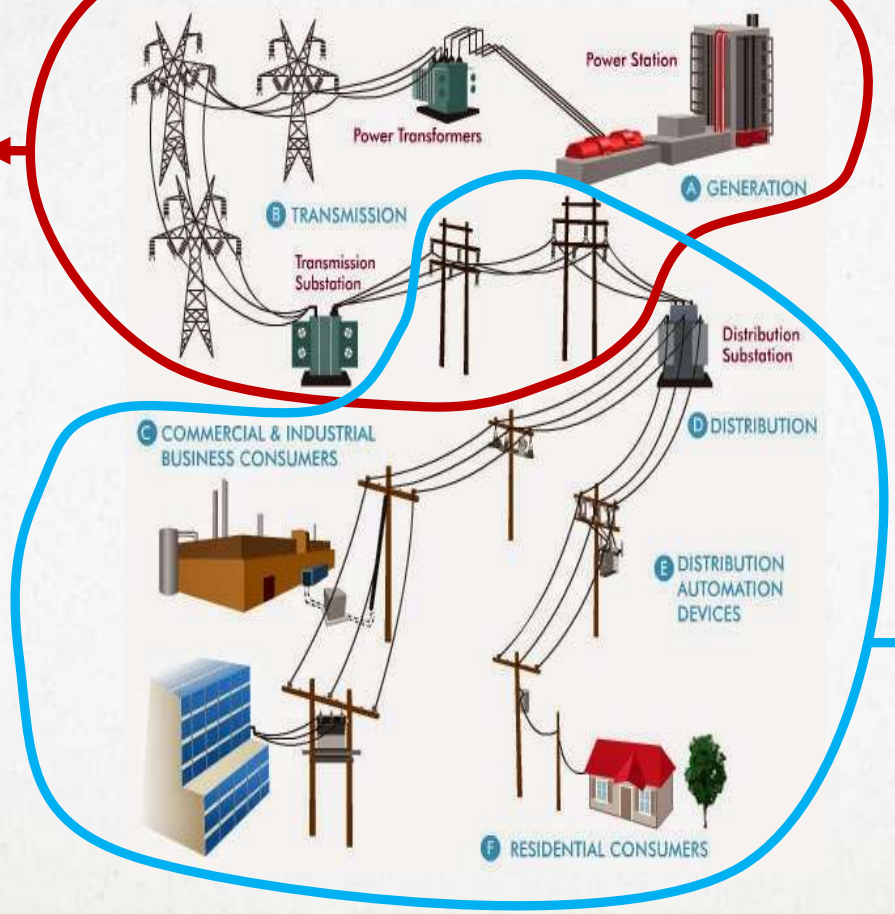
Empowered Energy™

THE GRID: LA PLATA ELECTRIC ASSOCIATION ("LPEA") PERSPECTIVE

Generation & transmission-owned facilities

TRI-STATE Generation and Transmission Association, Inc.

A Touchstone Energy® Cooperative



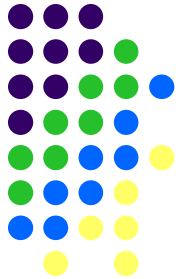
Distribution cooperative-owned facilities

LPEA La Plata Electric Association, Inc.

A Touchstone Energy® Cooperative

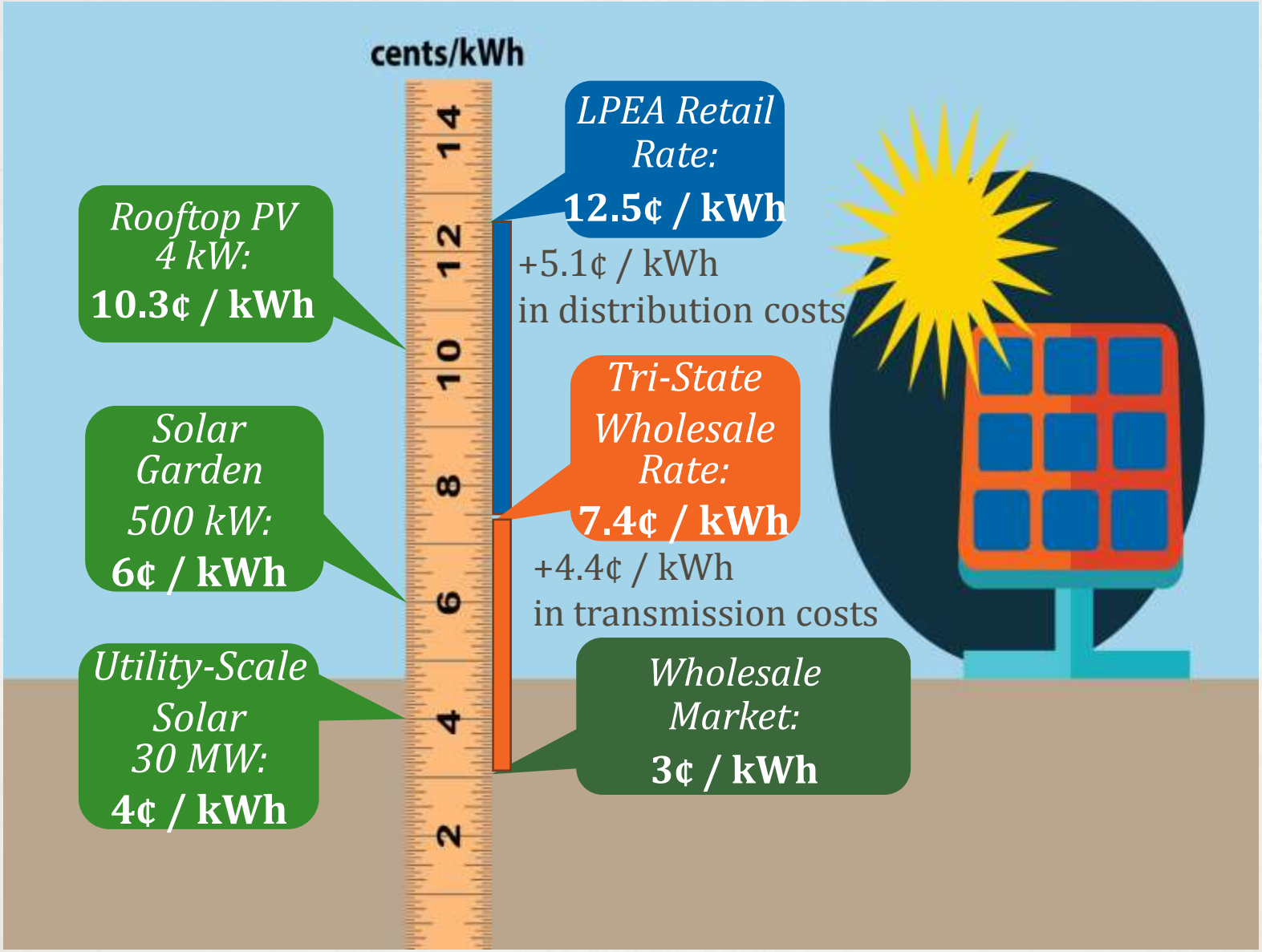
Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Integrating Renewables Into LPEA's Resource Mix," April 13, 2017.

LPEA: Residential Solar Photovoltaic ("PV") Options



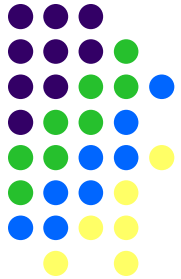
- ***Full retail rate credit for 100% of annual use***
- Net Energy Metering ("NEM") @ Point of Use
  - >100% of annual use: Average wholesale credit
  - PV equipment is usually owned by homeowner
- Community Solar Garden ("CSG")
  - PV installation generally distant from point of use, resulting in "virtual" NEM for CSG customers
  - 100-120% of annual use: Average wholesale credit
  - ***>120% of annual use receives no credit at all***
  - PV capacity usually leased from third-party owner

LPEA: NEM PRICING CHALLENGES

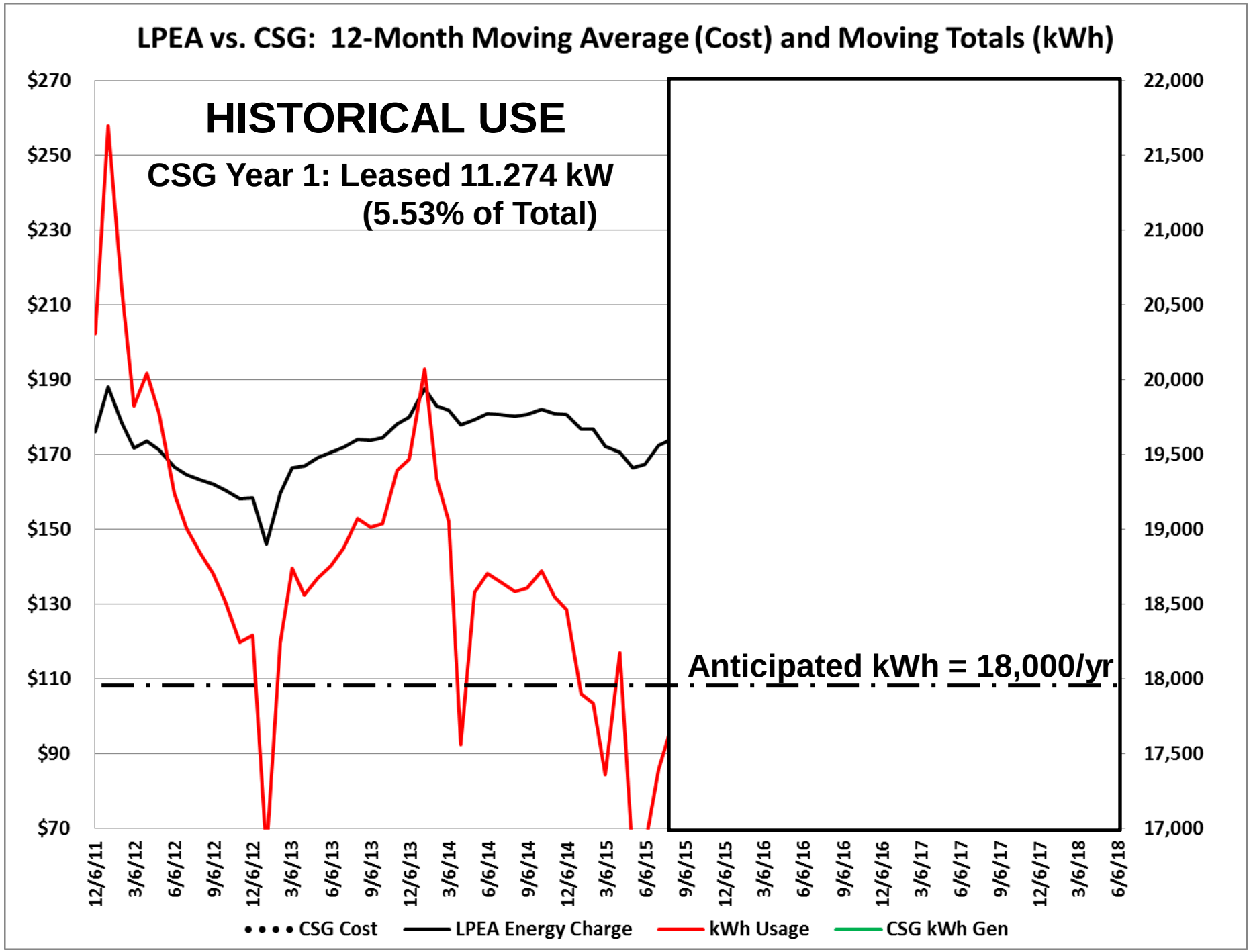


Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Integrating Renewables Into LPEA's Resource Mix," April 13, 2017.

CSG 20-Year Fixed Lease: More Now, Less Later (Maybe!)



- IF LPEA rates escalated at projected 5% p.a., economic crossover point would occur in Yr 9
- Significant environmental benefits projected
  - At 19,000 kWh/year of CSG generation:
    - 13.1 metric tons of CO_2 reductions/year, equal to:
      - Avoiding 31,194 vehicle miles = 1,477 gallons of gasoline
      - Planting 336 trees = 10.74 acres of forest
- Despite pie-in-the-sky rate escalation, signed on for anticipated 100% of annual use with first-in-time CSG in LPEA's service territory.


LPEA vs. CSG: 12-Month Moving Average (Cost) and Moving Totals (kWh)
HISTORICAL USE
CSG Year 1: Leased 11.274 kW
(5.53% of Total)
Anticipated kWh = 18,000/yr
$270
$250
$230
$210
$190
$170
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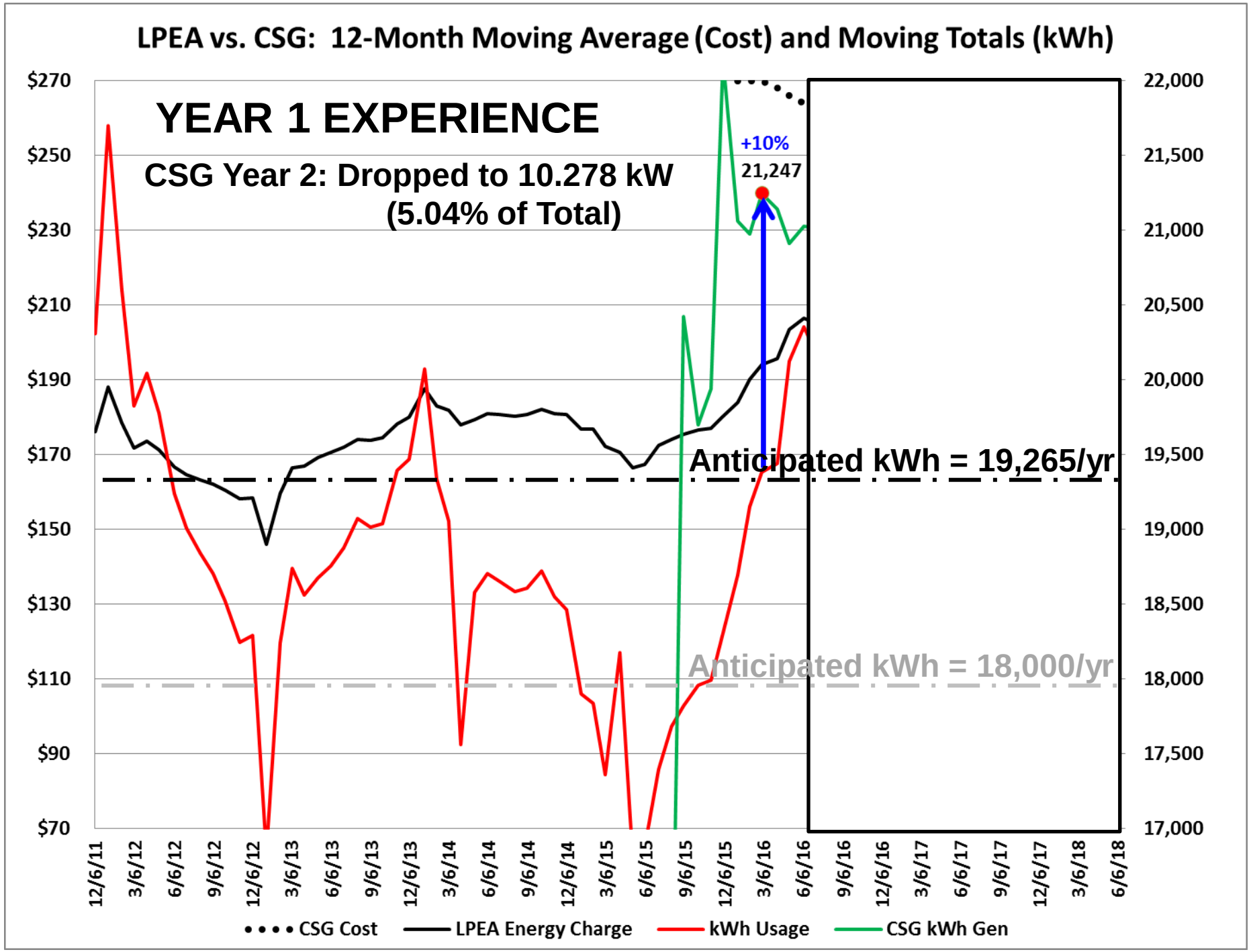
CSG Cost
LPEA Energy Charge
kWh Usage
CSG kWh Gen


LPEA vs. CSG: 12-Month Moving Average (Cost) and Moving Totals (kWh)
YEAR 1 EXPERIENCE
CSG Year 2: Dropped to 10.278 kW
(5.04% of Total)
+10%
21,247
Anticipated kWh = 19,265/yr
Anticipated kWh = 18,000/yr
$270
$250
$230
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LPEA Energy Charge
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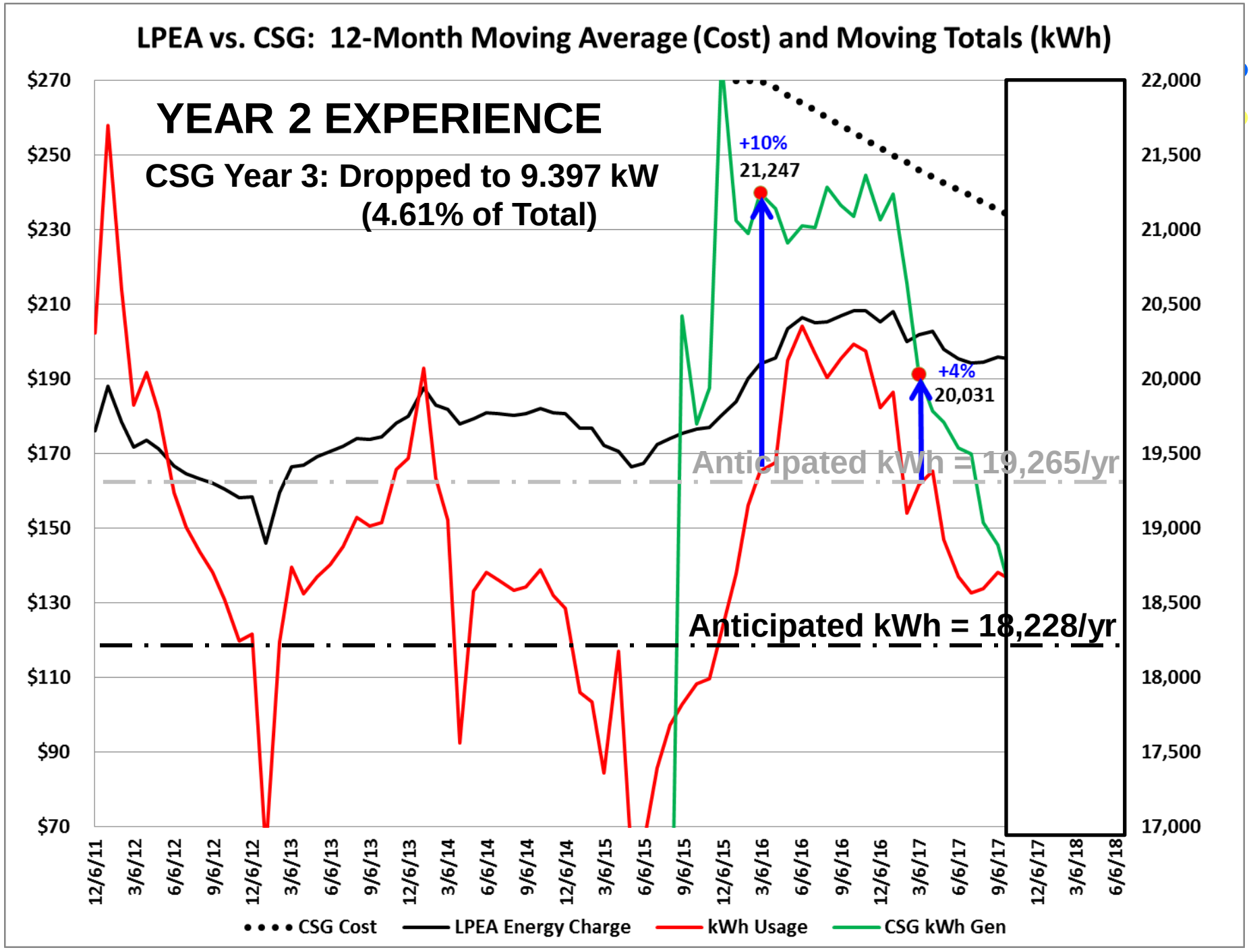
CSG kWh Gen


LPEA vs. CSG: 12-Month Moving Average (Cost) and Moving Totals (kWh)
YEAR 2 EXPERIENCE
CSG Year 3: Dropped to 9.397 kW
(4.61% of Total)
+10%
21,247
+4%
20,031
Anticipated kWh = 19,265/yr
Anticipated kWh = 18,228/yr
$270
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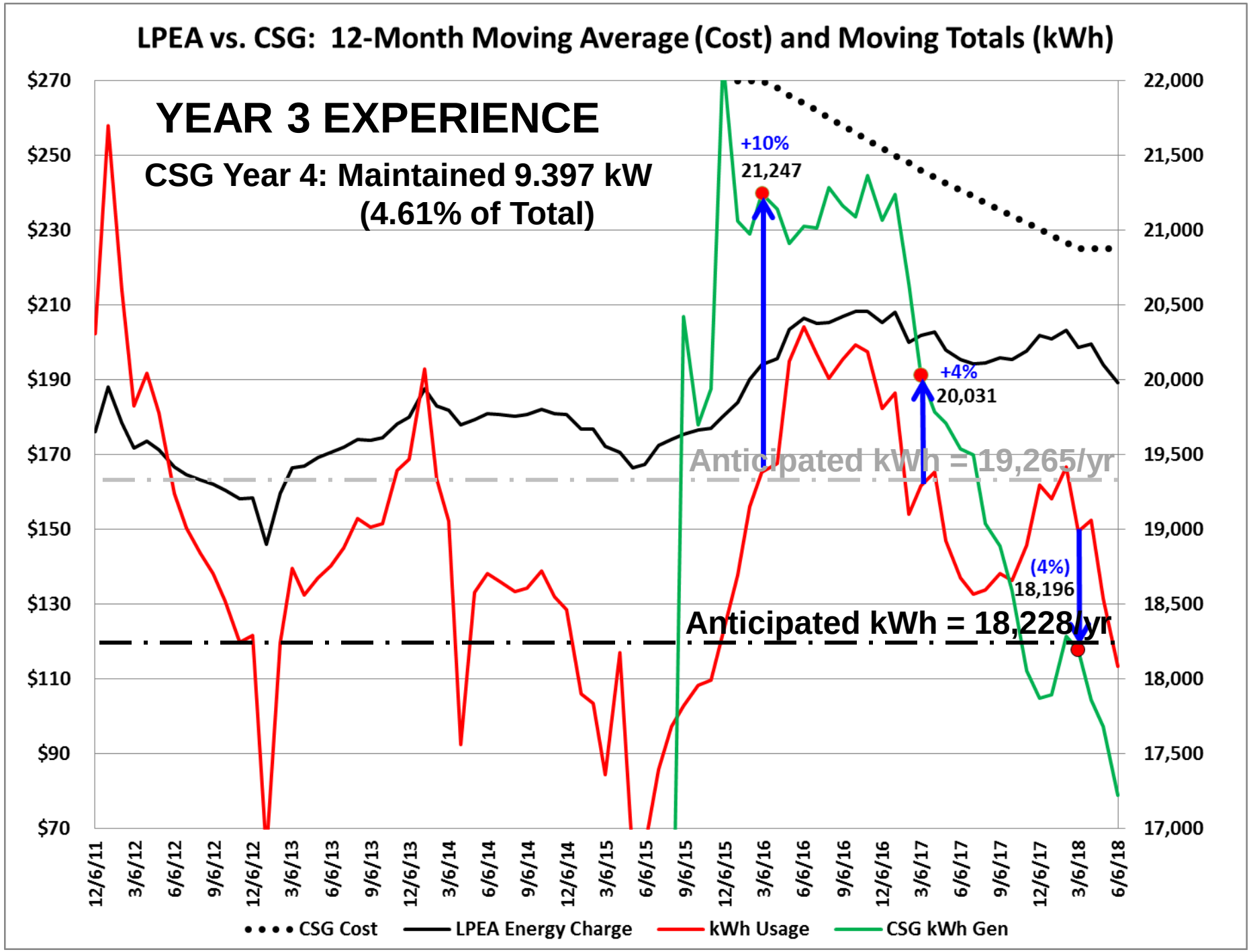
LPEA Energy Charge
kWh Usage
CSG kWh Gen


LPEA vs. CSG: 12-Month Moving Average (Cost) and Moving Totals (kWh)
YEAR 3 EXPERIENCE
CSG Year 4: Maintained 9.397 kW
(4.61% of Total)
+10%
21,247
+4%
20,031
(4%)
18,196
Anticipated kWh = 19,265/yr
Anticipated kWh = 18,228/yr
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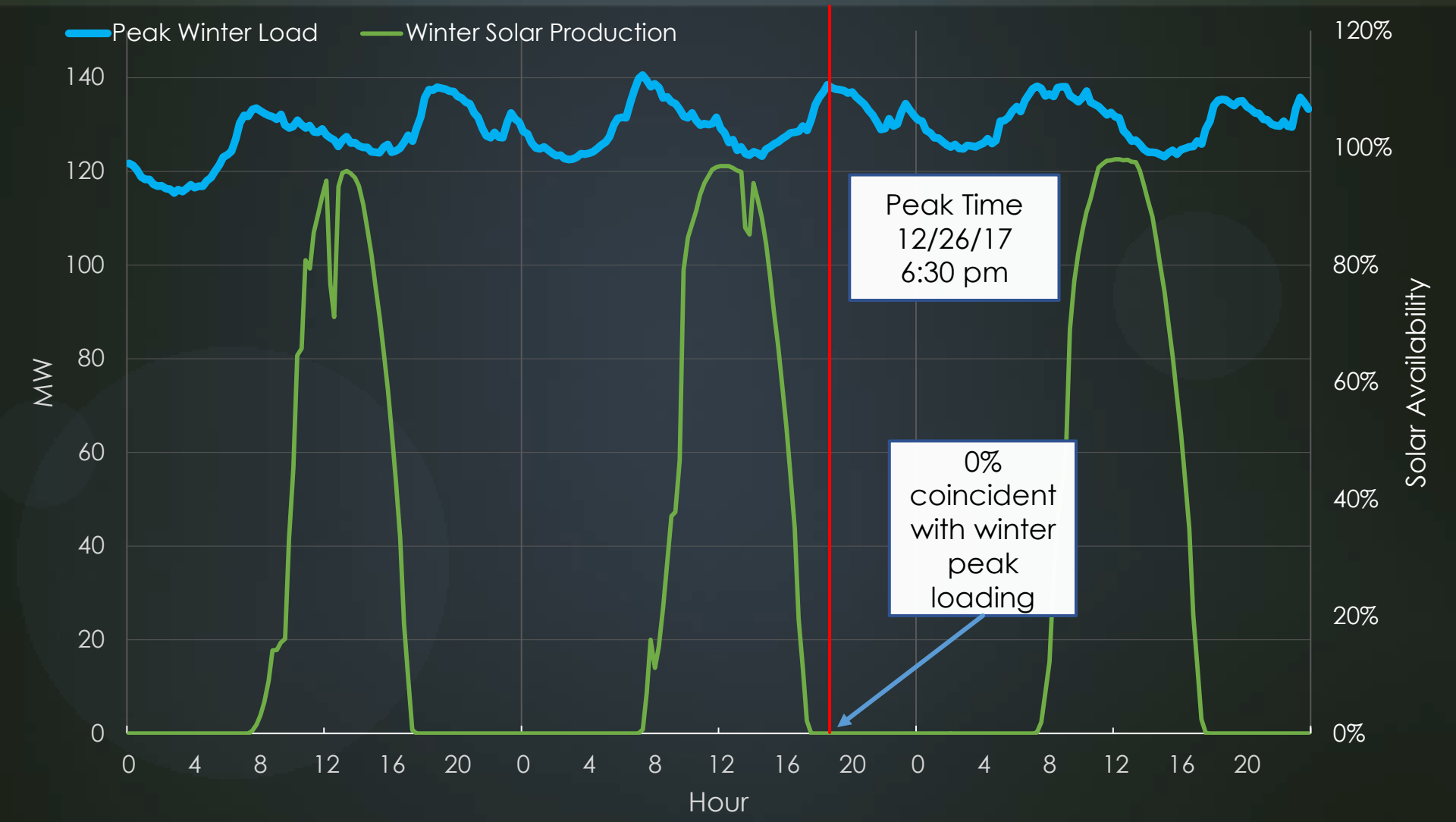
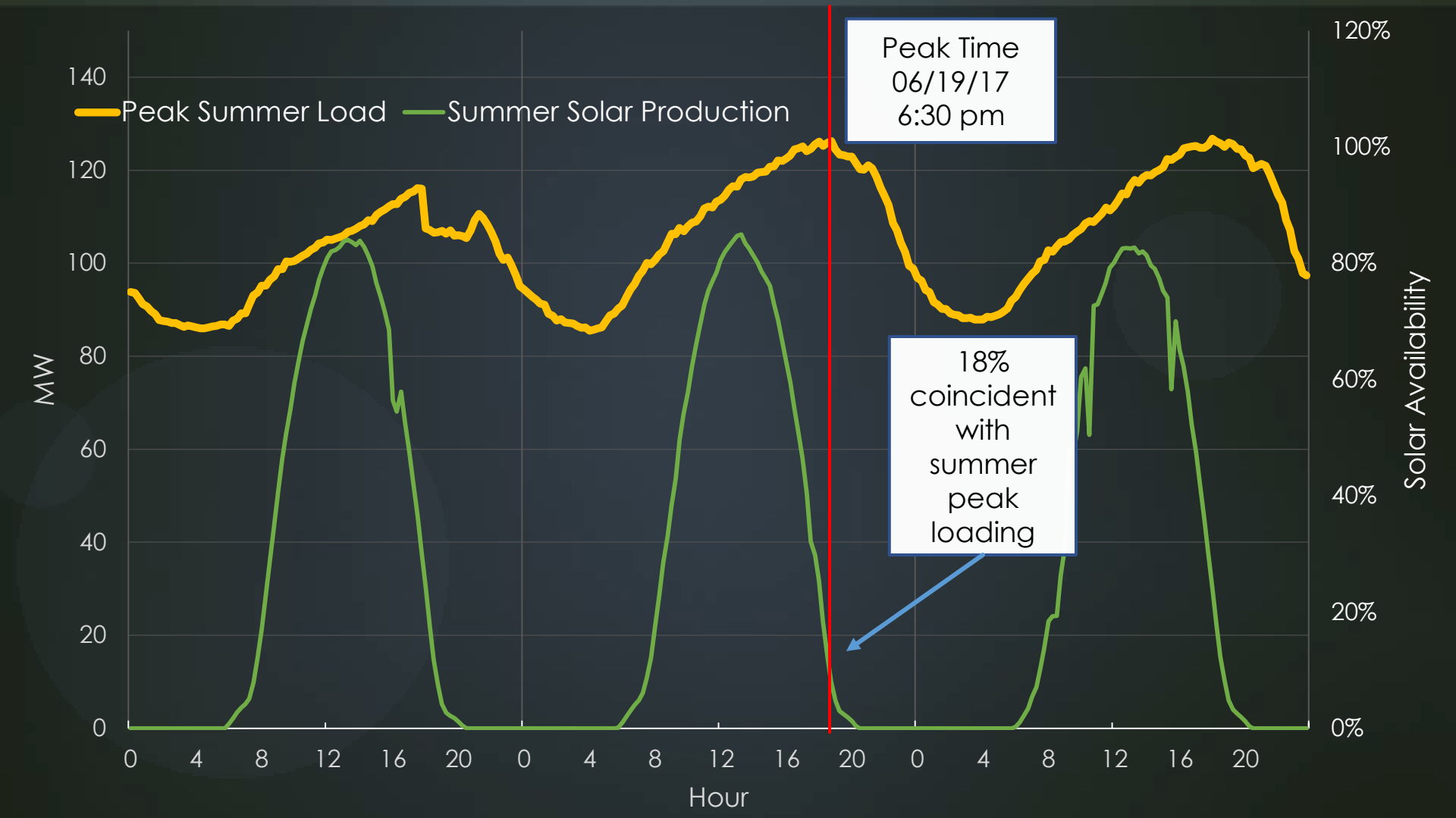
CSG Cost
LPEA Energy Charge
kWh Usage
CSG kWh Gen

LPEA: Winter Loading vs. "What if?" Solar Generation



Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

LPEA: Summer Loading vs. "What if?" Solar Generation



Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

12 Months of Actual LPEA Data: Solar % at Coincident Peak

Month	Date / Time of Peak	% Solar Available
Aug-17	08/31/17 5:00 pm	53%
Jul-17	07/05/17 5:00 pm	18%
Jun-17	06/20/17 6:30 pm	18%
May-17	05/18/17 9:00 pm	0%
Apr-17	04/03/17 8:00 pm	0%
Mar-17	03/06/17 7:00 pm	0%
Feb-17	02/06/17 7:00 pm	0%
Jan-17	01/25/17 7:00 pm	0%
Dec-16	12/26/16 6:30 pm	0%
Nov-16	11/30/16 6:30 pm	0%
Oct-16	10/06/16 8:00 pm	0%
Sep-16	09/19/16 8:00 pm	0%
Average Availability		**7%**

Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

LPEA's Expenses Drivers

Customer

Driven by number of customers. Nearly identical for each residential customer.

LPEA Demand

Driven largely by customer load at time of LPEA's system peak

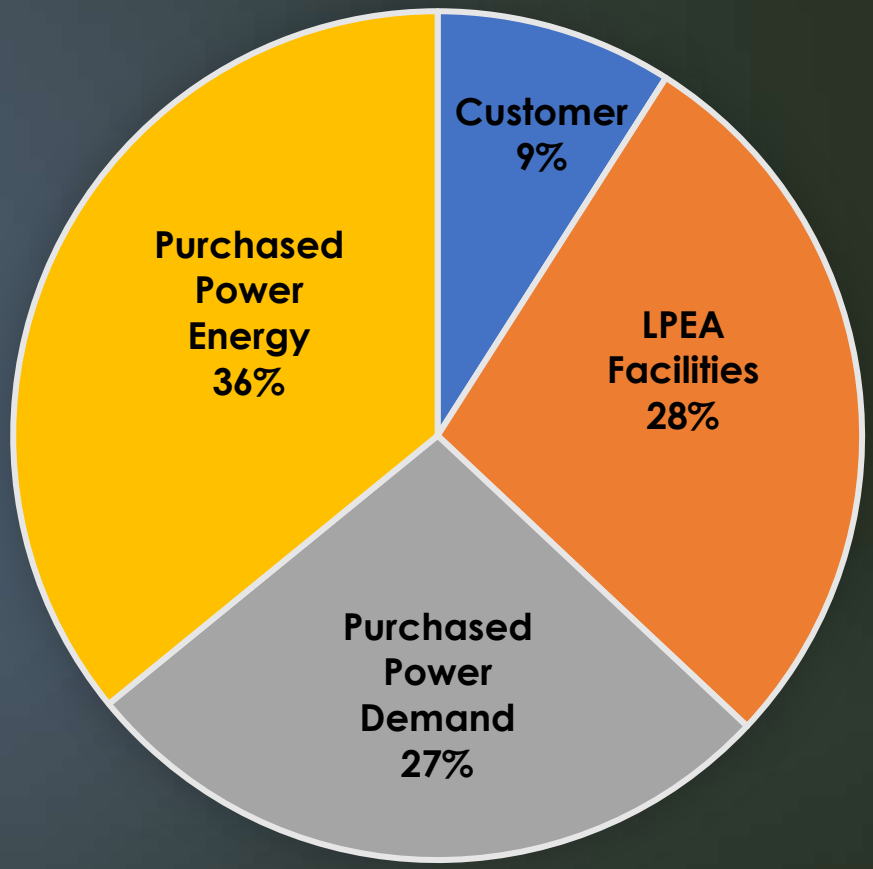
Purchased Power: Demand

Driven by customer load at time of LPEA peak during the peak period

Purchased Power: Energy

Expense associated with fuel and base load generation

Residential Expense Breakout



Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

LPEA: Monthly Residential Expenses vs. Revenues

	Typical Member (654 kWh)	High Usage Member (1,848 kWh)	Low Usage Member (273 kWh)	Solar Member (0 kWh)
Customer	$16.44	$16.44	$16.44	$16.44
LPEA Demand	$33.56	$64.35	$26.85	$33.56
Pur Pwr Demand	$21.27	$63.82	$11.60	$19.78
Pur Pwr Energy	$27.49	$77.69	$11.47	$0
Total Expenses	**$98.76**	**$222.30**	**$66.36**	**$69.78**
Standard Revenue	$103.66	$253.55	$55.75	$21.50
Standard Margin	$4.90 4.7%	$31.25 12%	-$10.61 -19%	-$48.28 -225%
Total Expenses	**$98.76**	**$222.30**	**$66.36**	**$69.78**

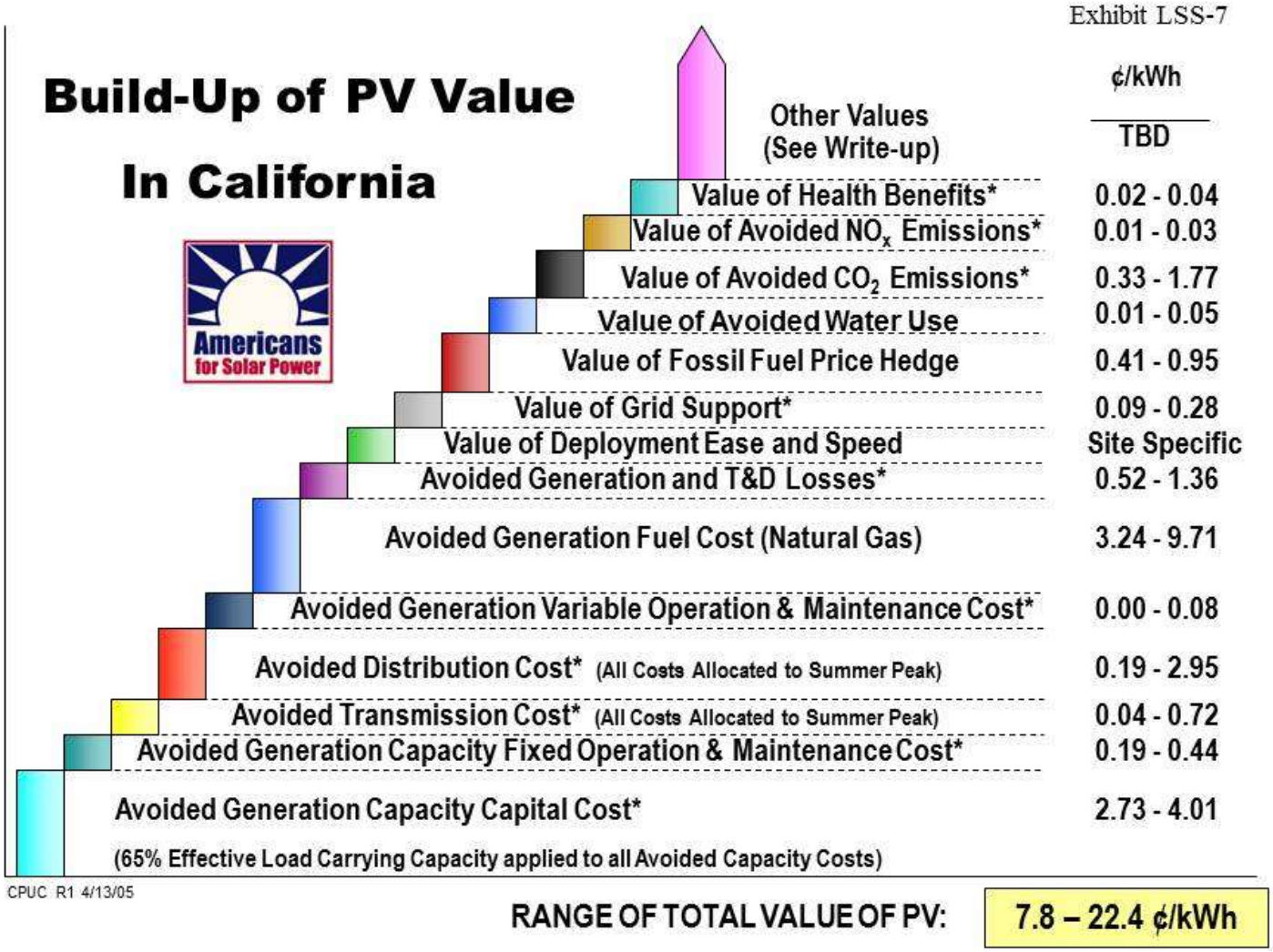
Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

LPEA: Net Metering Economics Summary

- If a typical 654 kWh member net meters with 100% solar
  - LPEA expenses decrease by $28.98
  - LPEA revenues decrease by $82.16
  - Net impact to LPEA is loss of $53.18 or $0.081/kWh
- LPEA currently net meters 10 million kWh annually
  - Impact from net metering is $810,000 annually
  - LPEA rates are currently 0.8% higher to accommodate current net metering practices

Source: Dan Harms, LPEA Manager of Rates, Technology, and Energy Policy, "Economics of Integrating Renewables," September 2017.

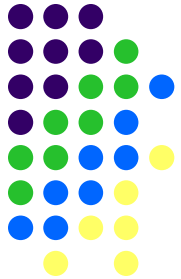
Would PV's Direct Costs to LPEA Be Offset by Its Benefits?



Source: CPUC, Docket No. R.04-03-017, ASPv, *Prepared Testimony on Itron Report on Framework for Assessing the Cost-Effectiveness of the Self-Generation Incentive Program*, April 13, 2005.

ILLUSTRATIVE ONLY

Conclusions: NEM for CSG Impacts *ALL* LPEA Members



- Jury still out on whether the NET impact to non-CSG participants is positive or negative
  - Ongoing debate on how to value (in)direct benefits
  - (In)direct benefits being incorporated into tariffs in some jurisdictions (*e.g.*, New York)
- Remote circuits in rural Colorado limit feasible PV capacity more so than for denser circuits
- Politically divided population = politically divided LPEA cooperative membership.

Thank you! Questions?

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