

Real Value of Net Energy Metering In California by Tom Rust

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The Misinformation

- Misinformation:
- NEM customers are costing non-customers \$
- Truth:
- NEM customers are subsidizing non-customers, and make the utilities \$ on their exported power



Independent Research

- A review of the value of solar methodology with a case study of the U.S. VOS₁
- The median value of NEM solar is \$0.30/kwh – far more than ANY utility pays for NEM solar
- Result: Utilities are making \$ from NEM customers

¹<https://digitalcommons.mtu.edu/michigantech-p/14539/>



Getting to 100% renewables

- We cannot get to 100% renewables without energy storage, and we currently have far less storage than solar
- Solar+Storage
- Wind+Storage



Net Energy Metering 1.0

- Promise:
- The value of power sent back to the grid = the same value of power taken from the grid
- Reality:
- Close, but additional charges incurred – interconnect, and monthly charges (about \$10/month)



Net Energy Metering 2.0

- Promise:
- The value of power sent back to the grid = the same value of power taken from the grid – minus Fixed \$/kwh Non Bypassable Charges (NBC) of roughly \$0.027/kwh



Net Energy Metering 2.0

- Reality:
- Additional charges include – interconnect, monthly charges (about \$10/month for residential), NBCs (roughly \$0.027/kwh), PCIAs (roughly \$0.03/kwh), IOU value of generation credits does not necessarily = CCA credits (mismatch can be as much as \$0.03/kw), plus city and state taxes



Net Energy Metering 2.0

- Reality:
- Worse case – IOUs shifted from peak rates 12-6pm to 4-9pm, cutting the value of solar generation as much as 40%



NEM Physical Reality

- Example residential customer:
- During a May day, customer generates as much as 5kw peak solar power, 20kwh energy
- Typical load will range from 0.2 to 1kw, during the day, 3kwh will go to loads.
- 17kwh is exported to grid



NEM Physical Reality

- Under NEM 1, customer receives full retail value average of \$0.22/kwh credit = \$3.74 credit paid to customer from IOU
- The 17kwh exported to grid is being used by customers immediate neighbors to power THEIR loads.
- Neighbors average rate plan as customer – they receive \$3.74 of “free” power from customer



NEM Physical Reality

- So IOU credits NEM customer \$3.74, and neighbor pays IOU \$3.74 for power actually generated by customer – net zero.
- **But wait**, IOU now does not need to pay system generation cost, transmission costs, distribution costs, ancillary services, losses, green house gas costs and all the costs included in Avoided Cost Calculations² for that 17kh.
- IOU SAVES Avoided costs (which includes generation charges and is TOU dependent, can be high as \$0.49/kwh, average is \$0.126/kwh) *17kwh=\$2.14 in profit from NEM customer

²Avoided Cost Calculator Model 2020, year 2022 – 10 year levelized – CPUC



NEM 2.0 Physical Reality

- Under NEM 2.0, the “additional” costs IOUs are charging, Fixed meter charges, NBCs and PCIAs, are in reality ADDITIONAL PROFIT IOUs are making(saving) for every kwh exported.
- So now IOUs make meter charges (\$0.02/kwh) + NBCs (\$0.027/kwh) + PCIAs (\$0.04/kwh) + Avoided costs² (which includes generation charges and is TOU dependent, can be high as \$0.49/kwh, average is \$0.126/kwh) = \$0.213/kwh

²Avoided Cost Calculator Model 2020, year 2022 – 10 year levelized – CPUC



NEM 2.0 Truth

- Under NEM 2.0, IOUs are SAVING MORE THAN \$0.213/kwh from NEM customers for every kwh exported.



NEM 2.0 Truth

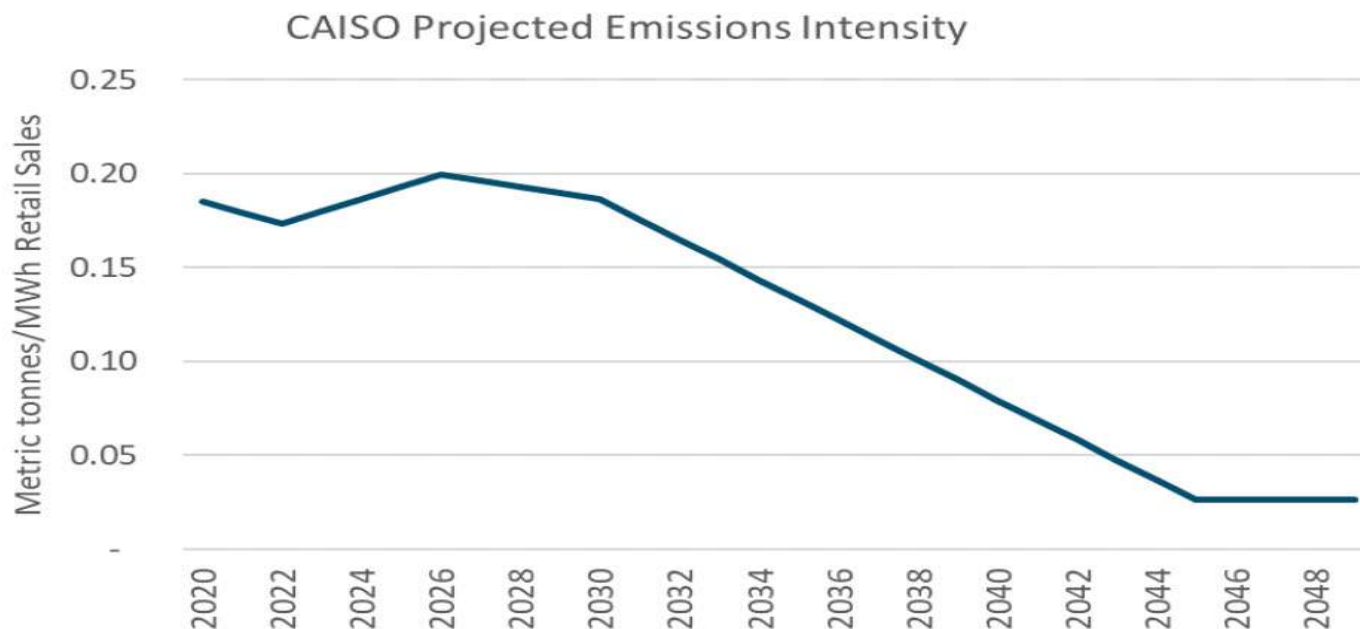
- This also holds true for the energy costs avoided by NEM customers self-supplying their loads – so they SAVE the IOUs all the Avoided Costs, AND still pay the meter charges – so value is \$0.126 (ACC savings) + meter charges (\$0.02/kwh) = \$0.146/kwh



NEM 3.0 ACC

- Under the proposed NEM 3.0 ACC, there will be an **INCREASE** in GHG emissions to 2030, in direct violation of the required 40% reduction in emissions from state mandated SB32

Figure 19. CAISO Projected Emissions Intensity, 2019 IRP Preliminary Results 46 MMT Case



As the RSP provides retail sales and GHG emissions through 2030, a linear progression was assumed between these 2030 values and the 2045 SB100 goals to estimate emissions intensity at that end-year.¹⁸



NEM 3.0 Proposal

- NEM customers charged same rate as everyone else who uses the grid for imports - TOU retail rates
- Utility pays NEM customer for exports retail TOU rate+Avoided Cost savings² for that period
- Ex: During peak, \$0.48/kwh (retail rate) +\$0.38/wkh(ACC savings)

²Avoided Cost Calculator Model 2020, year 2022 – 10 year levelized – CPUC



NEM 3.0 Proposal

- Export rate justification:
- Neighbors are paying utility at full retail rate of power generated by NEM customers (A)
- Utility saves avoided cost² from the generated power (B)
- Utility should pay NEM customer A+B

²Avoided Cost Calculator Model 2020, year 2022 – 10 year levelized – CPUC



NEM 3.0 Proposal

- Following slides show ACC³ value based on current EV2 TOU schedule (4-9pm Peak) for both summer (4 months) and winter
- Compare EV2 (residential solar+storage), B-10 (new small commercial rate), and Avoided Cost Calculator values for selected starting years and different levelizing periods

³Avoided Cost Calculator Model 2020 – CPUC



NEM 3.0 Proposal

Avoided Cost Rate Calculated Schedule – 2022 20 year levelized costs

Input Summer Rates				Input Winter Rates			
	EV2	B-10	ACC		EV2	B-10	ACC
Peak	\$0.48179	\$0.27436	\$0.38306	Peak	\$0.35467	\$0.19808	\$0.13951
Part Peak	\$0.37130	\$0.21267	\$0.21284	Part Peak	\$0.33798	\$0.00000	\$0.10975
Off Peak	\$0.16928	\$0.18010	\$0.09253	Off Peak	\$0.16928	\$0.16260	\$0.08896

Based on EV2 TOU rate periods – peak 4-9pm

³Avoided Cost Calculator Model 2020 – CPUC



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NEM 3.0 Proposal

Avoided Cost Calculated Rate Schedule – Year 2030 10 year levelized cost

	Input Summer Rates				Input Winter Rates		
	EV2	B-10	ACC		EV2	B-10	ACC
Peak	\$0.48179	\$0.27436	\$0.48240	Peak	\$0.35467	\$0.19808	\$0.26209
Part Peak	\$0.37130	\$0.21267	\$0.35373	Part Peak	\$0.33798	\$0.00000	\$0.20451
Off Peak	\$0.16928	\$0.18010	\$0.17209	Off Peak	\$0.16928	\$0.16260	\$0.16938

We propose this schedule be used, as it best represents costs including GHG goals

Based on EV2 TOU rate periods – peak 4-9pm

³Avoided Cost Calculator Model 2020 – CPUC



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NEM 3.0 Proposal

Avoided Cost Calculated Rate Schedule – Year 2040 10 year levelized cost

	Input Summer Rates				Input Winter Rates		
	EV2	B-10	ACC		EV2	B-10	ACC
Peak	\$0.48179	\$0.27436	\$0.86469	Peak	\$0.35467	\$0.19808	\$0.50616
Part Peak	\$0.37130	\$0.21267	\$0.69039	Part Peak	\$0.33798	\$0.00000	\$0.40433
Off Peak	\$0.16928	\$0.18010	\$0.34592	Off Peak	\$0.16928	\$0.16260	\$0.34286

Based on EV2 TOU rate periods – peak 4-9pm

³Avoided Cost Calculator Model 2020 – CPUC



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NEM 3.0 Proposal

Avoided Cost Calculated Rate Schedule – Year 2050 1 year levelized cost

	Input Summer Rates		
	EV2	B-10	ACC
Peak	\$0.48179	\$0.27436	\$1.43567
Part Peak	\$0.37130	\$0.21267	\$1.28030
Off Peak	\$0.16928	\$0.18010	\$0.50805

	Input Winter Rates		
	EV2	B-10	ACC
Peak	\$0.35467	\$0.19808	\$0.73932
Part Peak	\$0.33798	\$0.00000	\$0.59338
Off Peak	\$0.16928	\$0.16260	\$0.50490

Based on EV2 TOU rate periods – peak 4-9pm

³Avoided Cost Calculator Model 2020 – CPUC



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CARE and Low income customers

- Imports should be at a discounted rate – as they are now.
- Exports should be at FULL retail rate value + ACC credits
- This would add considerable incentives for solar/storage for this customer class.



Countering IOU arguments

- Misinformation:
- NEM customers are being subsidized by non-NEM customers
- Truth:
- The opposite – IOUs save \$ off of NEM customers – average of \$0.213/kwh for all exports, \$0.146/kwh for all energy self-consumed.



Countering IOU arguments

- Misinformation:
- IOUs are losing \$ to NEM customers
- Truth:
- The opposite – IOUs save \$ off of NEM customers – average of \$0.213/kwh for all exports, \$0.146/kwh for all energy self-consumed.



Countering IOU arguments

- Misinformation:
- IOUs are losing \$ due to NEM customers
- Truth:
- PG&E in particular had \$11 Billion⁴ in wildfire related claims (losses) in EACH YEAR 2018, 2019 – these costs are being passed to ratepayers over time due to their negligence

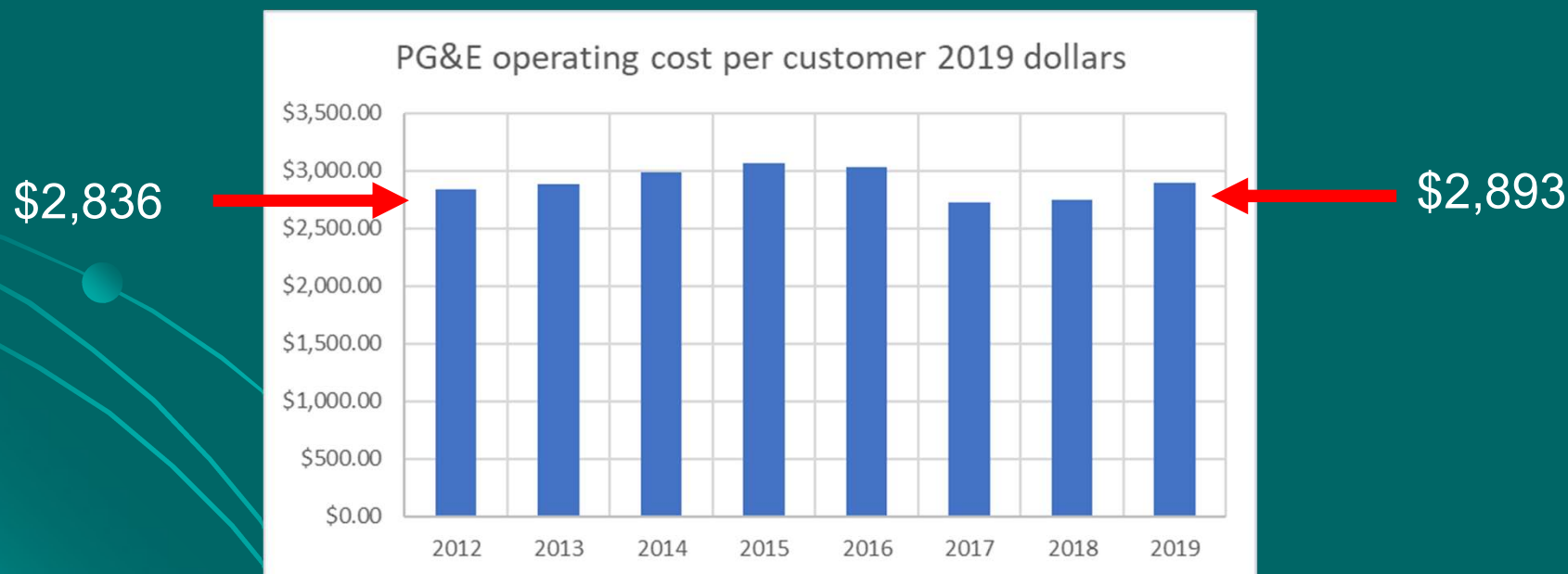
⁴ PG&E 2019 Annual report



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Countering IOU arguments

- Misinformation:
- IOUs are losing \$ due to NEM customers
- Truth:
- PG&E's operating expenses per customer⁵ WERE VIRTUALLY EXACTLY THE SAME over the period 2012-2019, when NEM customers increased

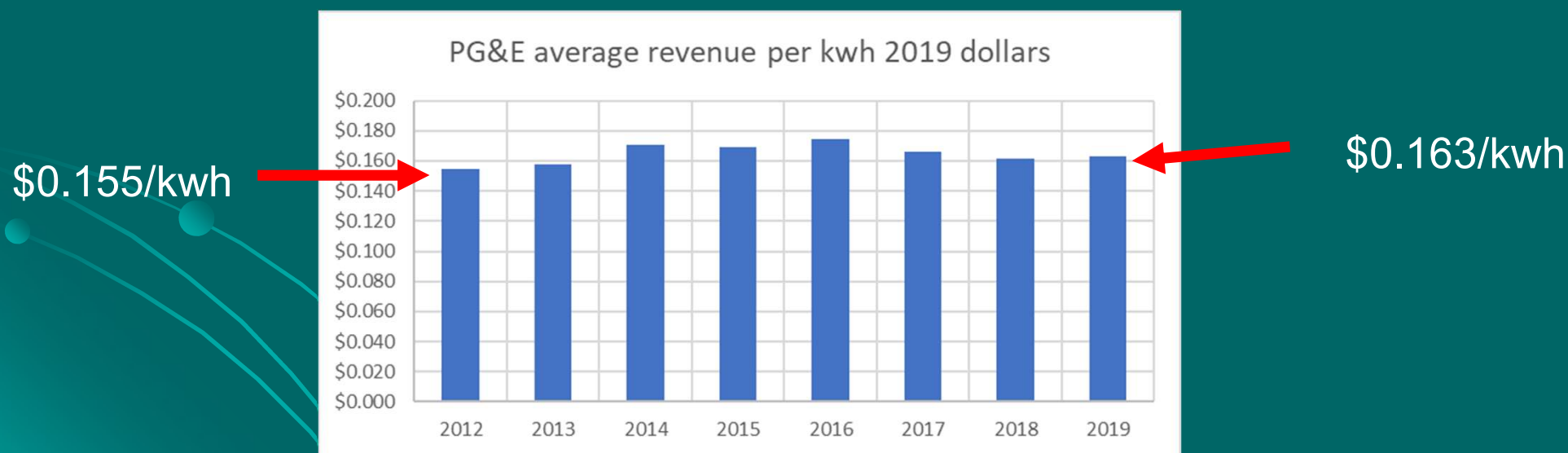


⁵ PG&E 2012 to 2019 Annual reports – revenue adjusted to 2019 dollars, wildfire claims not included



Countering IOU arguments

- Misinformation:
- IOUs are losing \$ due to NEM customers
- Truth:
- PG&E's revenue per kwh delivered⁶ INCREASED over the period 2012-2019, when NEM customers increased



⁶ PG&E 2012 to 2019 Annual reports – revenue adjusted to 2019 dollars



Countering IOU arguments

- Misinformation:
- Building utility scale solar is cheaper than local solar.
- Truth:
- Avoiding the cost of Generation Capacity, Transmission Capacity, Distribution Capacity, Ancillary Services and Losses BY LOCAL GENERATION saves average \$0.17/kwh⁷

⁷ Difference in Avoided Cost Calculator, 2030 20 year levelized cost 2020 CPUC version



Countering IOU arguments

- Levelized Cost of Energy (LCOE) – including 5 items above - utility Scale Solar+Storage average \$0.30/kwh (\$1.91/watt PV, \$265/kwh storage, 20 year lifetime – actually lasts longer)⁸
- Levelized Cost of Energy (LCOE) Residential Scale Solar+Storage average \$0.13/kwh (\$4/watt PV, \$500/kwh storage, 20 year lifetime – actually lasts longer)
- $\$0.30 - \$0.13 = \$0.17/\text{kwh}$

⁸Avoided Cost Calculator, 2030 20 year levelized cost 2020 CPUC version



Links

¹ PG&E 2019 Annual report

https://s1.q4cdn.com/880135780/files/doc_financials/2020/ar/PCG010_PGE_2019-Annual-Report_Web.pdf

² Avoided Cost Calculator Model 2020 – CPUC

<https://www.cpuc.ca.gov/general.aspx?id=5267>

Excel model:

ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/EnergyEfficiency/CostEffectiveness/2020%20ACC%20Electric%20Model%20v1c.xlsb



Thank You!

Tom Rust

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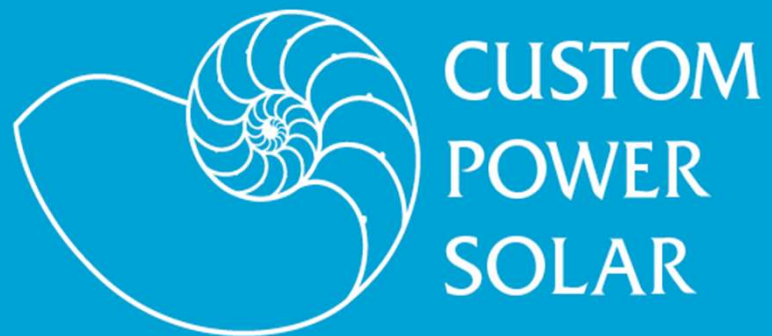
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SOLAR + ENERGY STORAGE

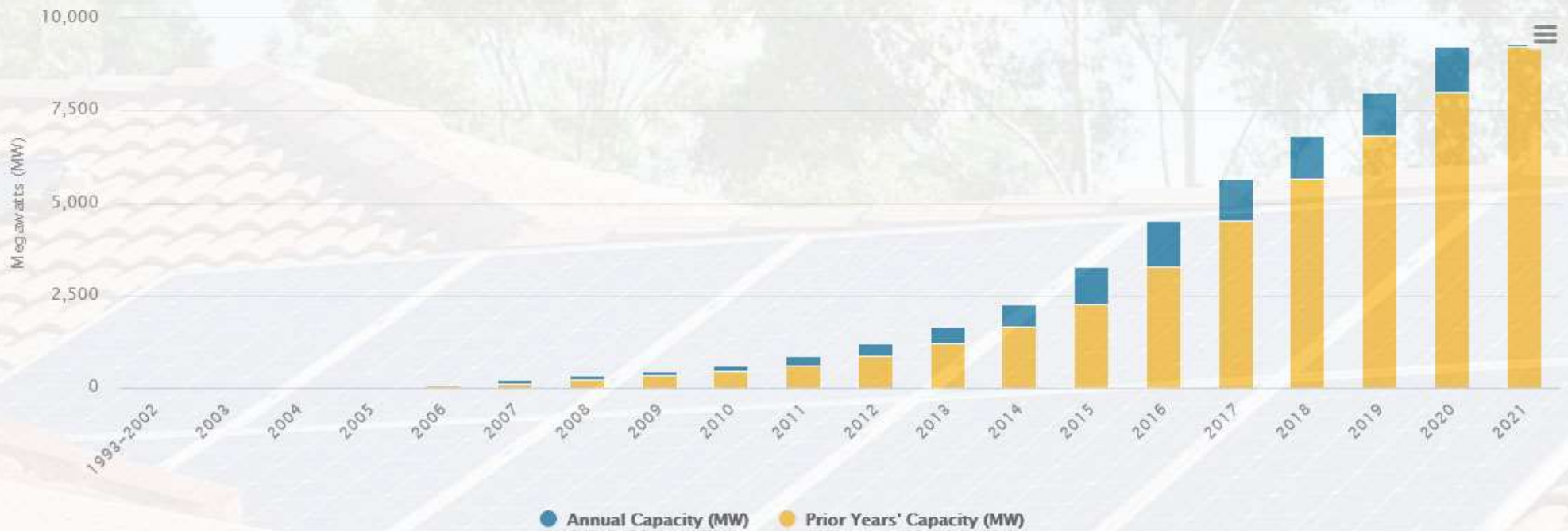


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Distributed Generation

California Leads the Nation in Distributed Generation

1,232,564 Solar Projects 10,296 Megawatts (MW) Installed ?



Data Current Through 2021-01-31 ?

Distributed Generation increased from roughly 1200MW to over 8000MW over the period 2012 to 2019



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2019 Total System Electric Generation

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	Total Imports (GWh)	Percent of Imports	Total California Energy Mix (GWh)	Total California Power Mix
Coal	248	0.12%	219	7,765	7,985	10.34%	8,233	2.96%
Natural Gas	86,136	42.97%	62	8,859	8,921	11.55%	95,057	34.23%
Oil	36	0.02%	0	0	0	0.00%	36	0.01%
Other (Waste Heat / Petroleum Coke)	411	0.20%	0	11	11	0.01%	422	0.15%
Nuclear	16,163	8.06%	39	8,743	8,782	11.37%	24,945	8.98%
Large Hydro	33,145	16.53%	6,387	1,071	7,458	9.66%	40,603	14.62%
Unspecified	0	0.00%	6,609	13,767	20,376	26.38%	20,376	7.34%
Non-Renewables and Unspecified Totals	136,139	67.91%	13,315	40,218	53,533	69.32%	189,672	68.30%
Biomass	5,851	2.92%	903	33	936	1.21%	6,787	2.44%
Geothermal	10,943	5.46%	99	2,218	2,318	3.00%	13,260	4.77%
Small Hydro	5,349	2.67%	292	4	296	0.38%	5,646	2.03%
Solar	28,513	14.22%	282	5,295	5,577	7.22%	34,090	12.28%
Wind	13,680	6.82%	9,038	5,531	14,569	18.87%	28,249	10.17%
Renewables Totals	64,336	32.09%	10,615	13,081	23,696	30.68%	88,032	31.70%
System Totals	200,475	100.00%	23,930	53,299	77,229	100.00%	277,704	100.00%



Current Solar+Storage 2020

- Peak 15.5 Gw Solar CAISO grid tied FTM
- Estimated 9.8Gw Solar NEM BTM - 14,700 Gwh energy produced per year.
- 4.2Gw of storage, but vast majority of that is hydro
- 216Mw of battery storage to increase to 923Mw by end of 2020
- *Even at 1Gw, that is less than 1/50th of what is needed to balance the existing solar generation*
- *We need at least 50Gwh more storage just to offset the existing solar*

