

# August 18, 2020 – The Autopsy

## Executive Summary

Coincidental high demand across the WECC left typically long regions less long, perhaps short, rendering each region left to its own to serve load. Most Balancing Authorities (BAs) had adequate resources; a few, like NEVP and AZPS, came close to running out of power. The ISO balanced by ordering rolling blackouts, though that might have been driven more by economics than a lack of supply.

The peak day, August 18, wasn't the WECC's peak, that was in 2018, July 24, and on that day prices were lower and there weren't any rolling blackouts. The difference between the two events was driven by the loss of Navajo, an idle gas plant (Harquahala), and a failure of renewable energy, specifically solar.

## Background

On August 18, 2020, the WECC's Palo Verde hub spot price cleared \$1,643.25/mwh, the highest WECC price ever recorded. The rest of the hubs were also high, but nothing close to PV. How did that happen? The obvious answer was heat, Phoenix reached a high of 113, though that wasn't the hottest day of the year; on July 30, the recorded temperature was 117, but on that day the spot price was just \$45/mwh. Other factors were at play.

## Methodology

Power prices are set by what some call a Dutch Auction, where the cost of the last MWH served sets the price for all MWH sold. Therefore, it is the last generating unit turned on which sets the price, but is there a \$1600/mwh unit in Palo Verde? No, there isn't; even a portable generator will operate at around a 20,000 btu/kwh heat rate. Using Socal Citygate's \$13/mmbtu, that still only returns a \$260/mwh price. How could the market have traded at \$1600? There are no \$1600 units.

There comes a point where power markets disconnect from power costs and trade in a no man's land where prices are set by scarcity pricing. The price clears at whatever level the load-serving utility is willing to pay to keep the lights on; call it poker where the final price is set by which utility

blinks first. California won't pay as high a price and is willing to balance the grid using rolling blackouts, Arizona's "blink" price is higher, \$1600. The study identified eight Summer "events" over the last three years as defined by high prices. It examined the fundamentals (supply and demand) of each of those events to determine what was different for the August 18 event.

## Eight Events

These eight events were selected based upon the maximum average WECC prices by year for the summer months. WECC prices are compiled by averaging ten daily HL spot hubs. The period examined is four days before and after the selected date. The temperature is an average of eight cities, not weighted. Demand is the sum of the thirty load-serving Balancing Authorities (BA) actual demand, as reported by the EIA.

Event ID	Event	date	Power Price	Temp	Load	coal	gas	hydro	solar	wind	renew
1	2020 Sep 5	9/5/2020	\$256.76	98	121,855	17,570	55,105	22,082	7,227	7,503	14,730
2	2020 Aug 18	8/19/2020	\$689.10	93	131,224	18,330	55,869	27,686	6,393	7,671	14,064
3	2020 July 31	7/30/2020	\$77.64	93	121,298	16,371	51,315	28,790	10,167	5,193	15,360
4	2020 July 11	7/10/2020	\$62.37	90	118,439	16,271	49,134	29,999	10,382	5,078	15,460
5	2019 Sep 3	9/5/2019	\$68.74	89	122,495	19,606	52,639	23,272	6,728	3,574	10,302
6	2019 June 11	6/11/2019	\$61.25	91	117,530	17,531	43,902	32,144	7,842	4,307	12,149
7	2018 Aug 9	8/7/2018	\$185.53	93	129,502	23,495	53,539	26,941	8,356	4,321	12,677
8	2018 July 24	7/24/2018	\$188.88	96	134,612	21,576	50,766	29,040	7,311	7,056	14,366

Though the August 18 event had the highest price, it didn't have the highest load (July 24, 2018), nor was it the hottest day (September 5 2020). To understand why prices soared to quad digits, we need to break the WECC into regions.

- Northwest – made up of the MidC BAs plus Idaho Power.
- NoCal – PG&E, BANC, ZP26, and TIDC
- SoCal – SCE, SDGE, IID, LDWP
- Southwest – AZPS, SRP, TEPC, WALC, NEVP, PACE

Each of the four regions is summarized in the following tables, each with these metrics:

- PP – Power Price; an average of Ice Daily HL settles
- Temp – Temperature, an average of several cities
- Demand – Sum of BAs mapped to that region
- Exports – Exports minus Imports by region.
- Coal – Sum of coal MW by BA per the EIA
- Gas – Sum of natural gas MW by BA per the EIA
- Hydro – Sum of Hydro MW by BA per the EIA
- Solar – Sum of Solar MW by BA per the EIA
- Wind – Sum of Wind MW by BA per the EIA

# Southwest

Event ID	Event	date	Power Price	Temp	Demand	Exports	Coal	Gas	Hydro	Solar	Wind
1	2020 Sep 5	9/5/2020	\$486.75	107	36,607	(57)	7,841	19,513	1,324	1,585	783
2	2020 Aug 18	8/19/2020	\$1,460.38	106	38,762	(2,786)	7,765	19,528	1,684	1,295	720
3	2020 July 31	7/30/2020	\$75.32	109	38,711	(4,407)	7,248	19,152	1,561	2,074	670
4	2020 July 11	7/12/2020	\$72.88	106	38,250	(4,059)	6,606	20,272	1,568	1,923	1,382
5	2019 Sep 3	9/3/2019	\$91.80	101	36,621	(591)	8,475	18,744	1,714	1,299	554
6	2019 June 11	6/11/2019	\$90.83	98	31,089	3,057	8,039	16,661	1,889	1,714	792
7	2018 Aug 9	8/9/2018	\$186.42	99	34,307	260	10,668	17,891	1,780	1,645	562
8	2018 July 24	7/24/2018	\$172.70	108	37,980	(2,071)	11,268	14,146	1,691	979	840

- The August 18 event had the highest price by a factor of 4 (versus September 5) but a factor of 9 versus the earlier events.
- Highest demand, but just 200 MW higher than the July 31
- Sep 5, 2020, had the second-highest prices but just the 6th highest demand.
- Note the September 5 net imports fell 2700 MWs; the Southwest was long and exported almost as much as it imported

Two factors drove the Southwest's prices in the August 18 event (versus the July 30 event):

1. Solar was off by 700 aMW (300 higher in the September 5)
2. Imports fell by 1700 aMW.

The Southwest ran out of energy and prices gapped during the August 18 event because renewables failed and the neighboring regions cut exports. Perhaps the real culprit was the early retirement of Navajo and the ridiculous decision not to bring Harqualah online. The significant difference between the September 5 and August 18 events was that not all regions realized high loads on September 5.

# Southern California (Socal)

Event ID	Event	date	Power Price	Temp	Demand	Exports	Coal	Gas	Hydro	Solar	Wind
1	2020 Sep 5	9/5/2020	\$218.61	102	31,149	(5,830)	1,795	17,614	993	4,303	372
2	2020 Aug 18	8/18/2020	\$172.12	91	31,031	(4,523)	1,797	19,023	1,535	3,669	1,148
3	2020 July 31	7/30/2020	\$138.48	82	24,955	(1,208)	1,249	15,159	1,132	6,333	1,675
4	2020 July 11	7/10/2020	\$155.13	85	25,513	(2,995)	1,070	14,360	898	6,318	1,096
5	2019 Sep 3	9/5/2019	\$77.65	87	31,182	(4,762)	1,761	15,927	1,189	4,238	1,313
6	2019 June 11	6/12/2019	\$51.41	78	25,056	(3,730)	1,514	12,206	1,441	6,072	1,624
7	2018 Aug 9	8/7/2018	\$340.74	92	33,530	(4,054)	1,803	17,017	1,340	5,171	1,704
8	2018 July 24	7/24/2018	\$312.57	89	33,957	(4,149)	852	17,657	1,541	5,028	2,765

- September 5 loads were higher than August 18, but 2000 MWs lower than the 2018 events.
- Both September 5 and August 18 realized Imports were 2-3000 higher than the other two July 2020 events; September 5 imports were the most of any event.
- Solar failed in both the Aug and Sep events when compared to solar from the two July events.
- Gas was off 1400 MW in Sep vs. the Aug
- The wind failed in the Sep event, off 800 MWs from Aug.

Why the August rolling blackouts? Not because of demand, simply because Solar failed, despite Socal's heavy reliance upon thermal resources (coal and gas). In a word, Socal needed more gas resources, less dependence upon non-California entities to serve its load, and less reliance upon renewables.

## Northern California (Nocal)

Event ID	Event	date	Power Price	Temp	Demand	Exports	Coal	Gas	Hydro	Solar	Wind
1	2020 Sep 5	9/5/2020	\$36.50	99	20,324	(1,608)	-	10,346	4,112	855	81
2	2020 Aug 18	8/18/2020	\$168.81	99	23,929	(1,324)	-	11,237	5,758	727	246
3	2020 July 31	7/30/2020	\$87.57	86	18,609	(682)	-	9,109	5,036	1,256	353
4	2020 July 11	7/11/2020	\$90.67	95	20,152	(1,396)	-	8,509	4,468	1,216	335
5	2019 Sep 3	9/5/2019	\$58.70	83	18,362	(845)	-	9,131	5,138	851	276
6	2019 June 11	6/12/2019	\$51.10	94	22,755	(1,001)	-	7,462	6,288	1,192	358
7	2018 Aug 9	8/7/2018	\$208.00	83	19,672	(432)	-	9,835	4,848	1,002	372
8	2018 July 24	7/24/2018	\$211.67	91	22,641	(758)	-	10,206	5,906	1,020	574

- September 5 was 3600 MW lower than August 18
- Imports were up 300
- Solar and wind failed

Northern California fared better than Southern California as the region has strong ties to the Northwest, has more gas power plant reserves, and a robust hydro system.

## Northwest

Event			Power								
ID	Event	date	Price	Temp	Demand	Exports	Coal	Gas	Hydro	Solar	Wind
1	2020 Sep 5	9/5/2020	\$98.47	84	18,017	4,366	1,822	4,432	14,114	297	3,368
2	2020 Aug 18	8/19/2020	\$361.32	87	21,889	3,553	2,071	4,744	17,470	254	2,187
3	2020 July 31	7/30/2020	\$45.15	96	23,732	3,150	2,212	4,763	19,170	359	1,094
4	2020 July 11	7/13/2020	\$28.68	78	19,197	4,013	1,752	3,746	19,552	398	940
5	2019 Sep 3	9/5/2019	\$72.01	86	20,500	1,487	2,611	5,428	13,760	149	431
6	2019 June 11	6/12/2019	\$49.71	89	23,058	1,195	1,833	4,627	19,484	205	260
7	2018 Aug 9	8/6/2018	\$192.01	90	22,932	906	2,225	6,166	15,884	281	595
8	2018 July 24	7/23/2018	\$157.74	93	23,592	1,962	2,183	6,129	18,583	267	670

- August 18 realized record-high summer power price
- Just Fifth highest demand; September 5 demand was nearly 4000 MW lower
- Hydro was off because the NW didn't need the energy
- Sep was the highest exports; Aug was second highest exports; a sign the region was healthy
- Robust wind; renewables did NOT fail
- 1300 MWs less Gas than the previous high, suggesting ample reserves

So why the high prices? Opportunistic pricing. The AC tie to Northern California set the price for all of the Northwest; in effect, the Northwest ratepayers paid for California's failed renewables.

## Socal Gas Factor

Socal Citygate's spot price soared from \$1.97 on the 10th to \$13.35 on the 18th, not an unexpected jump in price given the dramatic increase in gas sendout (demand). What was surprising was how slow Socal Gas ramped up receipts, unlike its sister utility, PG&E.

## PG&E Daily Change in Demand and Supply

By the 18th, PG&E had accumulated 100 MMCF more gas than on the 10th. Note the rapid increase in receipts, starting on the 11th (108) and cresting on the 14th (663 MMCF).

Date	Demand	Receipts	Balance
8/10/2020	0	0	0
8/11/2020	-53,000	108,000	161,000
8/12/2020	264,000	320,000	56,000
8/13/2020	396,000	558,000	162,000
8/14/2020	518,000	663,000	145,000
8/15/2020	541,000	477,000	-64,000
8/16/2020	381,000	670,000	289,000
8/17/2020	739,000	754,000	15,000
8/18/2020	763,000	863,000	100,000
8/19/2020	588,000	762,000	174,000
8/20/2020	529,000	574,000	45,000
8/21/2020	552,000	476,000	-76,000
8/22/2020	405,000	390,000	-15,000

Socal planned a bit differently...

## Socal Gas Daily Change in Demand and Supply

Date	Demand	Receipts	Balance
8/10/2020	0	0	0
8/11/2020	94,000	0	-94,000
8/12/2020	230,000	135,292	-94,708
8/13/2020	350,000	234,046	-115,954
8/14/2020	664,000	206,141	-457,859
8/15/2020	1,072,000	256,762	-815,238
8/16/2020	827,000	256,762	-570,238
8/17/2020	792,000	256,762	-535,238
8/18/2020	1,293,000	329,046	-963,954
8/19/2020	1,421,000	377,108	-1,043,892
8/20/2020	1,252,000	425,046	-826,954
8/21/2020	1,242,000	545,046	-696,954
8/22/2020	1,170,000	570,046	-599,954

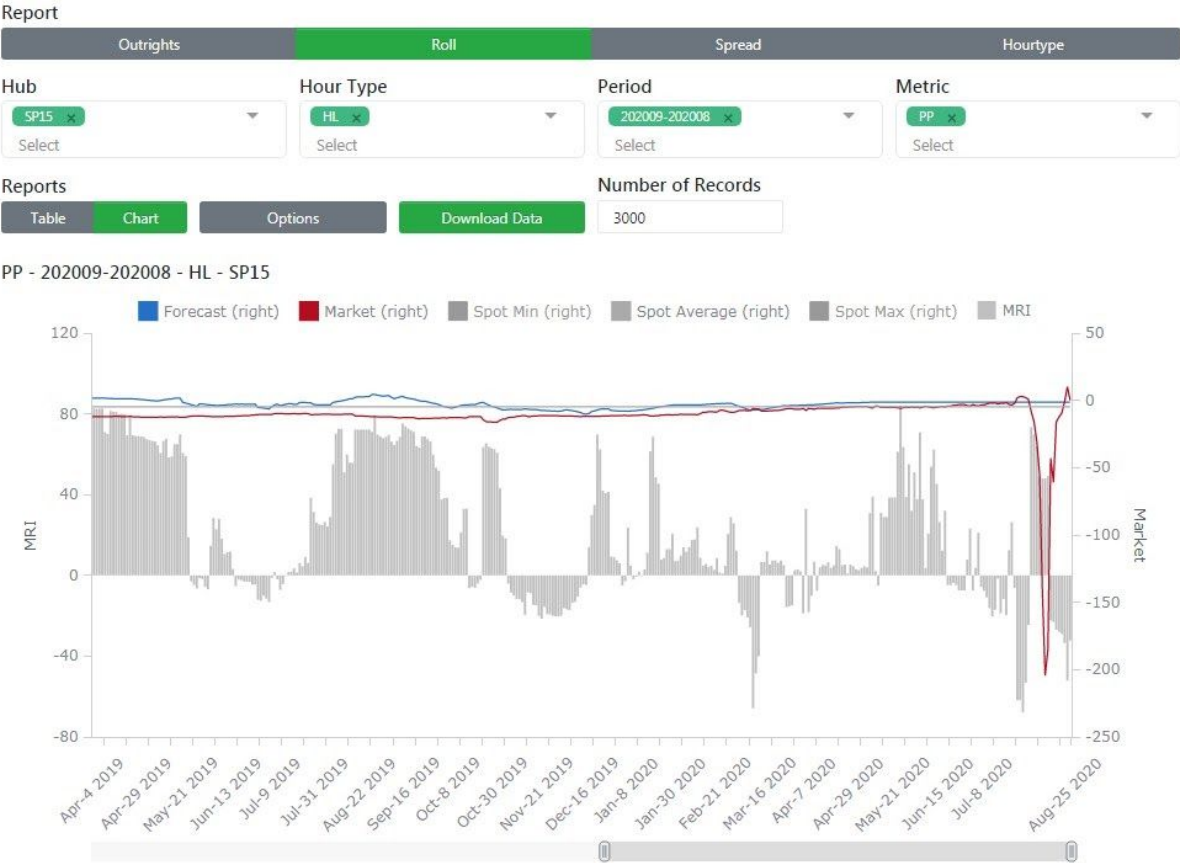
By the 14th, Socal was running a 457 MMCF deficit as compared to the 10th. Receipts (imports) were only 256 MMCF higher by the 17th and didn't crest until the 22nd, though by then the heat had mostly dissipated. What would the spot gas price had been had the utility ramped its imports up on the 12th and 13th, as did PG&E?

If you assume that Socal's slow response drive up Citygate and Border by \$2.00/mmbtu, and a 10k heat rate, the incremental burden on Southern California's ratepayers was about a \$125 million in additional power purchase costs. But the cost of their forecasting failure to the Southwest ratepayers (Nevada and Arizona) was twice that, or about \$250 million since both regions use Socal Border prices, which were directly correlated to Socal Citygate.

# Broken Term Market

The cash markets (Day Ahead, Hour Ahead, EIM) reflect supply and demand, but those markets were not the only ones impacted by the event; term markets were also shaken.

TradeRank – Historical



Take the [SP15, September-August roll](#); it dropped \$200 in a few days, then recovered all \$200 a few days later. This market behavior, gapping up and falling back, reflects the illiquidity and fear of the term markets, all of which can be explained by a lack of market depth. That dearth of liquidity is a direct result of an over-regulated market that the FERC, CFTC, and the California AG created through its post-Energy Crisis witchhunts and the wars they declared upon power traders. Ultimately, just the ratepayers paid for those misbegotten policies.

# Conclusions – Aug 18 Event

Only the Southwest ran out of reserves, though California experienced rolling blackouts, those were driven more by economics than a lack of physical energy. The Northwest had no issues, though it enjoyed the highest prices of any event. The Southwest shortfall was driven by the coincidental high WECC demand, which resulted in import cuts from Utah, New Mexico, and Colorado. The Northwest had ample resources but lacked the transmission capacity to deliver energy to the Southwest. Though the Southwest loads were only 200 MW higher than the July 30 event, its price was nearly 20 times higher. The most crucial driver for those high prices was the 2000 MW cut in imports, which was driven by coincidental WECC-wide demand, but that WECC demand was 2000 MW lower than the July 24, 2018 event.

Ultimately, the Southwest failed not because of demand, but because of the retirement of the Navajo coal plant and the idle Harquahala gas-fired plant. Had both of those plants been available, there would not have been an event, no blackouts in California, and no \$1600 prices in the Southwest. Exacerbating an already delicate situation was the WECC's increasing reliance upon unreliable renewables, especially solar.

# Conclusions – Sep 5 Event

Only Southern California realized extreme heat. The rest of the WECC was reasonably long and helped cover some of Socal's loads. Another difference was the duration of the heat was limited to 3-4 days versus over a week during August. A similarity was the failure of renewables at a time when the ISO most needed them. Clearly, the WECC is not ready to go carbon-free.