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Renewables Insights

Examination of Nevada Power Company's Record Low Solar and Solar + Storage PPA Announcement

In early June 2018, the state of Nevada made public a Nevada Power Company filing to the Public Utility Commission (PUC) of Nevada for approval to sign six power purchase agreements (PPAs) for solar photovoltaic (PV) projects totaling 1001 MW, three of which included battery storage totaling 100 MW/400 MWh[1]. The announcement of these PPAs made headlines for both the record low price of the PV (for the U.S.) and, perhaps more importantly, for the small price premium required for the inclusion of storage. This Renewable Insight looks at the details of this filing to analyze the pricing premium of the storage, doing so in two ways: as an "adder" to the PPA price and as a standalone price of storage. To begin, the high-level details for each of the individual projects can be found in Table 1 below.

Table 1: Details of the Six Nevada Power Projects

Project Name	Developer	Technology	PV Capacity	Battery Capacity
Dodge Flat	NextEra	PV + Battery	200 MW	50 MW/200 MWh
Fish Springs	NextEra	PV + Battery	100 MW	25 MW/100 MWh
Battle Mountain	Cypress Creek	PV + Battery	101 MW	25 MW/100 MWh
Eagle Shadow	8minutenergy	PV	300 MW	N/A
Copper Mountain	Sempra	PV	250 MW	N/A
Techren V	174 Power Global	PV	50 MW	N/A

Techren V is scheduled to come online on 12/31/20, Battle Mountain on 6/1/2021, and all others on 12/31/2021 which allows for all to receive the full Federal solar Investment Tax Credit (ITC) of 30% before it starts to decline in 2022. Further, all of the projects with storage are bid with the assumption they will qualify for the solar ITC[2]–meaning that at least 75% of the energy used to charge the batteries must come from the solar PV system[3]. These tax credits, as well as a lack of details on supplier agreements, mean that the PPA numbers and the analysis below are only examining the price–and not the cost–of these systems.

Key Takeaway

The Nevada Power Company filing is the most recent example that many use to cite the price of storage as being only a few $/MWh addition to the cost of PV. However, caution should be used with this approach as the amount of storage is relatively small compared to the size of the PV system. Looking at the cost of storage for only the MWh serviced by the storage system presents a more realistic price of storage–and still highlights the impressive cost reductions in the technology over the past few years.

1. Supply Side Plan, Transmission Plan, Economic Analysis, Distribution Planning, and Financial Plan. Nevada Power. June 1, 2018. http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2018-6/30452.pdf
2. The Nevada Power Request for Proposals (RFP) required that any storage system bid must qualify for the ITC. Source: *Ibid.*
3. In order to qualify for the solar ITC, the storage system must receive >75% of its charged energy from the solar system. The amount of the ITC scales with the amount of charged energy from the solar system between 75 and 100%, i.e., a storage system that receive 85% of the value of the ITC. See 26 CFR 1.48-9(d)(6) for further details.

The filing contains details on the estimated power production, PV degradation, PPA price, and length of the PPA term for each of the six projects. For the three projects with battery storage, a separate monthly capacity payment is specified. The details for the PV portion of each of the projects can be found in Table 2, while the details for the storage portion of the projects with batteries can be found in Table 3.

Table 2: PPA Price, PV Power Production, PV Degradation, and PPA Term for the Six Nevada Power Project

Project Name	PPA Price ($/MWh)	PV Output (MWh)	Annual Degradation	PPA Term (Years)
Dodge Flat	27.51	574,307	0.50%	25
Fish Springs	29.96	270,632	0.50%	25
Battle Mountain	26.50	296,655	0.40%	25
Eagle Shadow	23.76	922,909	0.30%	25
Copper Mountain[4]	21.55	720,222	0.50%	25
Techren V	29.89	140,443	0.30%	25

Table 3: Storage Capacity Payment, Payment Escalator, and Capacity Payment Term Project Details for the Three Nevada Power Projects with Storage

Project Name	Storage Capacity Payment ($/MW-mo)	Capacity Payment Escalator	Capacity Payment Term (Years)
Dodge Flat	6,110.00	2%	15
Fish Springs	6,200.00	2%	15
Battle Mountain	7,755.00	N/A	10

Given this information, the total payment for each of the projects can be calculated for the first 10 years of the project–this is presented in Figure 1.

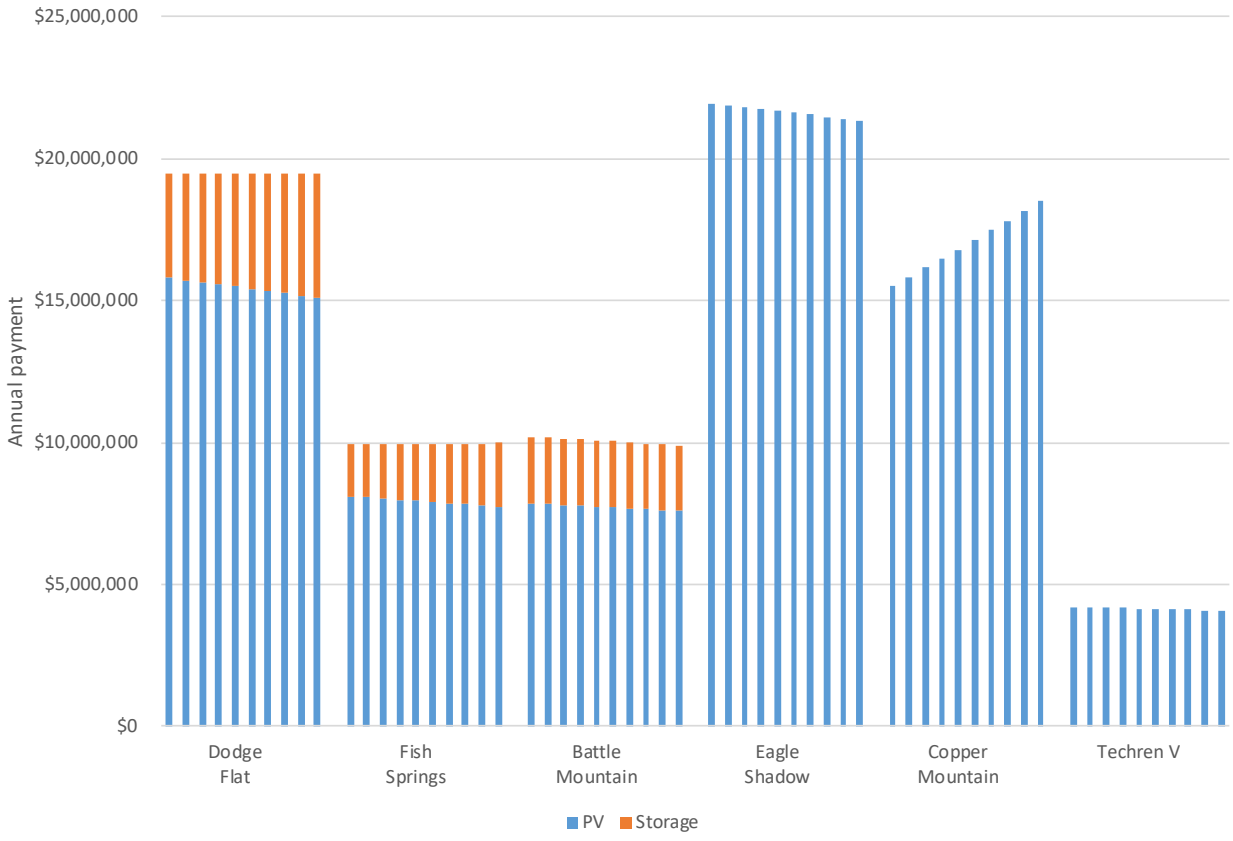

Figure 1: Nevada Power PPA Annual Payment by Source (Note that each individual bar represents one year)

4. The Copper Mountain PPA includes an annual 2.5% escalator.

With the payment numbers from Figure 1 and the energy production from Table 2 along with the associated anticipated degradation, an aggregated total price for all six projects can be calculated along with an aggregated PV price[5]. If the aggregated PV price is subtracted from the aggregated total price, an effective PPA price "adder" for the storage can be calculated. This price is presented in the "Price 'Adder' for Storage" column in Table 4. Many analysts and articles that have recently examined the U.S. PV + storage PPA price announcements cite the price of storage using a methodology similar to this approach. In all U.S. cases thus far, this makes the price of storage look minimal. However, use of this methodology in these cases can be misleading as U.S. PV + storage announcements have consisted of storage systems that are just a fraction of the size of the PV system. As an example, in the Nevada Power case discussed here the storage systems collectively service ~5% of the total PV energy generation when assuming one full cycle per day.

Alternatively, the price of storage can be calculated based only on the MWh provided from the storage system. Assuming that the battery fully cycles only once per day, which is optimistic given that cloudy days and times that the battery is down for service will prevent a full cycle every day, a cost per MWh of storage can be calculated by dividing the storage revenue by the battery system output, which is presented in the final column of Table 4.

Table 4: Total Payment and Various Total Price Components for the Aggregated Six Nevada Power PPAs

Year	Total Payment	All in Price ($/MWh)	Solar Price ($/MWh)	Price "Adder" for Storage ($/MWh)	Price of Storage ($/MWh)
1	$81,268,121	$27.78	$25.10	$2.68	$53.78
2	$81,457,756	$27.96	$25.23	$2.73	$54.54
3	$81,656,691	$28.15	$25.37	$2.78	$55.31
4	$81,865,088	$28.34	$25.50	$2.84	$56.10
5	$82,083,112	$28.53	$25.65	$2.89	$56.90
6	$82,310,931	$28.73	$25.79	$2.94	$57.72
7	$82,548,718	$28.94	$25.94	$3.00	$58.56
8	$82,796,649	$29.14	$26.09	$3.05	$59.41
9	$83,054,901	$29.36	$26.25	$3.11	$60.28
10	$83,323,659	$29.58	$26.41	$3.17	$61.17

The methodology is used to calculate the "Price of Storage" in Table 4 presents a more realistic, though still impressive relative to the recent past, number for the price of storage as it only utilizes the payment to and energy serviced by the storage system itself. It should be noted that this analysis has its shortcomings as well as it ignores energy services, and their values, from the storage system. EPRI will be examining this issue for PV + storage in an upcoming report to be released this fall.

5. These six projects are aggregated here because they are effectively purchased by a single party (Nevada Power Company) in one solicitation and, for this reason, many analysts who examine the price of storage do so in terms of all the storage being solicited.

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