

Solar PV Battery Installations in Honolulu 2024 Update

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RESEARCH AND ECONOMIC ANALYSIS DIVISION

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

STATE OF HAWAII

This report was produced by the Research and Economic Analysis Division headed by Eugene Tian, Division Administrator. The 2024 update report was prepared by Xiufu Shuai, Research Statistician under the direction of Yang-Seon Kim, Research and Statistics Officer.

This report provides an update of the status of solar photovoltaic (PV) battery installations in Honolulu County. The report was first published in 2018 to enhance our understanding of battery installation activities on Oahu and has been updated annually. Statistics in this report were calculated based on building permit data from the Department of Planning and Permitting (DPP), City and County of Honolulu. Building permits for solar PV and battery installation were identified based on the type of work reported in the permit applications.¹

Residential PV and battery installation

Solar PV installation on Oahu started to increase gradually since 2008 and boomed in 2012 and 2013 with about 28,000 PV systems installed in this two-year period alone. However, installing battery storage together with PV system was very rare until 2017. Although the first building permit for residential PV battery installation was issued in February 2008, the number of cases installing battery storage with PV was no more than ten per year until 2015.

A battery-connected PV system has become a more attractive option since October 2015 when the State Public Utilities Commission closed the net-metering program and reduced compensation for the excess power sent to the grid by solar PV owners. As a result, 2017 had seen a significant growth of battery storage installation with a total of 731 permits issued for PV installation with battery storage (“PV plus battery” henceforth) in that year. The number of permits issued for PV plus battery doubled in 2018 and in 2019, then the growth slowed down. Encouraged by the battery bonus program, that was introduced to provide incentives for battery installation and was effective July 2021-December 2023, battery installation increased rapidly again from 2021 to reach 6,830 permits issued in 2023 for PV installation with battery storage.

Table 1 summarizes the total numbers of building permits issued for residential PV and/or battery installation, and their average and median permit values for the period of 2017 to 2024. As shown in the table and Figure 1, combining battery storage with PV system has become an increasingly popular choice since 2018. In 2017, PV plus battery permits accounted for 26.8 percent of the total residential PV permits issued in that year. This percentage jumped significantly to 62.7 percent in 2018 and continued to climb to reach 94.2 percent in 2023 and then down a little to 90.0% in 2024.

Besides the permits for installing a battery together with a PV system, there were permits issued for battery installation not associated with a solar PV system (“battery only” henceforth), presumably additions of a battery to the existing solar PV system. Total number of these permits

¹ Battery installation was not explicitly indicated in permit application until 2017, so it had to be identified based on job description. Since 2017, the building permit application offers two types of PV related projects to choose: “Solar PV Installation Only (no battery)” and “Solar PV Installation w/ Battery Storage”, making it easier to tell if the PV project included a battery storage or not.

was quite small with only 315 “battery only” permits issued for the 7 years between 2017 and 2023. These “battery only” permits increased significantly in 2024 with another 315 permits issued in this year alone.

Including the 630 permits issued for battery only installations, a total of 29,807 building permits were issued for installation of battery storage on Oahu from 2017 to 2024.

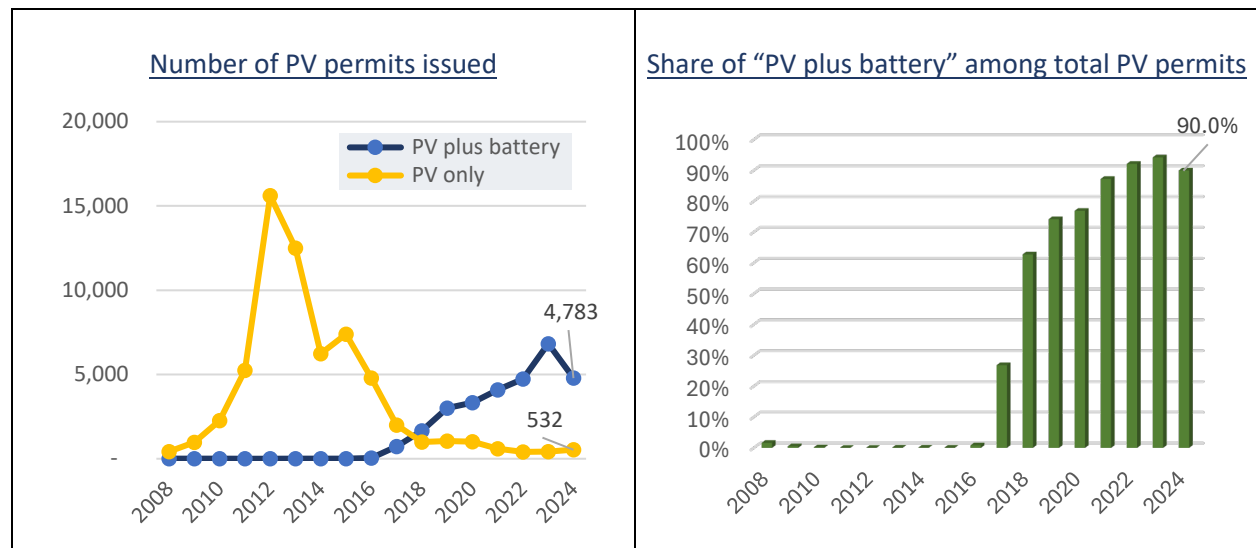
Table 1. Building permits issued for residential PV and battery installation, 2017-2024

Year	PV plus battery			Battery only			PV only		
	Number of permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)	Number of permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)	Number of permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)
2017	731	29,475	27,552	33	12,799	12,400	1,996	24,407	23,000
2018	1,659	34,995	32,000	21	7,971	8,000	985	23,045	22,000
2019	3,003	35,491	31,000	11	7,773	7,000	1,046	18,744	15,633
2020	3,336	30,987	28,000	39	6,788	4,000	1,003	18,737	15,000
2021	4,092	31,708	29,000	120	15,506	14,000	599	19,045	15,000
2022	4,743	34,351	30,000	4	9,750	11,500	406	19,220	16,250
2023	6,830	31,996	28,000	87	11,084	10,500	419	16,897	13,000
2024	4,783	35,590	31,500	315	12,330	11,500	532	14,203	12,000

¹ Permits that were cancelled or revoked after being issued were excluded.

² Average and median values were calculated based on “accepted value” indicated in the building permit. PV/battery permits that were combined with other types of building work were excluded from calculating the average or median permit values because the PV related cost could not be separated from other costs.

Figures 1. Trend of residential PV installation with a battery, 2008-2024



Residential PV and battery installation in 2024

In 2024, a total of 4,783 permits were issued for PV plus battery installation, which was about 2,000 less than the 2023 level but close to the 2022 level. In addition, a total of 315 permits were issued in 2024 to add batteries to the existing PV systems.

Table 2. Number of building permits issued for residential PV and battery installation in 2024

Permit Type	Total issued in 2024	By the month the permit was issued											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PV plus battery	4,783	364	331	366	399	385	310	398	416	453	465	414	482
Battery only	315	17	17	21	16	20	20	34	31	22	33	49	35
PV only	532	19	19	30	50	32	38	56	48	46	92	57	45

When measured by the accepted value indicated in the permit, the average cost of installing a PV plus battery system in 2024 was \$35,590, 11.2 percent increase from the average value of 2023 permits but 3.6 percent increase compared with the average value of 2022 permits. About half of the PV plus battery projects issued in 2024 cost between \$20,000 and \$40,000 while about a third cost over \$40,000. The median project cost of PV plus battery installation was \$31,500, about \$4,000 less than the average cost.

The average value of the permits for installing battery alone and PV alone in 2024 was \$12,330 and \$14,203 respectively, less than half of the average value of PV plus battery projects.

Table 3. Cost of residential PV and battery installation in 2024 ¹

Value	PV plus battery		Battery only		PV only	
	Number of permits	Percent	Number of permits	Percent	Number of permits	Percent
< \$5,000	29	0.6%	57	18.1%	37	7.0%
\$5000 - \$10,000	26	0.5%	69	21.9%	142	26.9%
\$10,000 - \$20,000	624	13.1%	134	42.5%	243	46.0%
\$20,000 - \$30,000	1,438	30.3%	46	14.6%	78	14.8%
\$30,000 - \$40,000	970	20.4%	6	1.9%	17	3.2%
> \$40,000	1,666	35.1%	3	1.0%	11	2.1%
Total permits used in cost calculation	4,753	100%	315	100%	528	100%
Average value (\$)	35,590		12,330		14,203	
Median value (\$)	31,500		11,500		12,000	

¹. PV/battery permits that were combined with other types of building work were excluded for this table because the PV related cost could not be separated from other costs.

Commercial PV and battery installation

A total of 84 PV plus battery permits were issued for commercial use in 2024 with an average permit value of \$906,461 and a median permit value of \$41,000. The average permit value was much higher than the median value because of an over 50-million-dollar permit issued in the year. Besides that, there were two more permits issued for a commercial PV plus battery project with over a million accepted value. There were also five permits issued for a commercial battery-only project in 2024, with an average value of 20,840 and a median value of \$22,000.

Table 6. Building permits issued for commercial PV and battery installation, 2017-2024

Year	PV plus battery			Battery only			PV only		
	Number of permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)	Number of Permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)	Number of permits issued ¹	Average permit value ² (\$)	Median permit value ² (\$)
2017	7	44,443	26,000	2	4,750	4,750	199	174,537	53,550
2018	49	89,360	42,500	1	12,400	12,400	113	486,727	85,675
2019	69	39,753	37,029	1	20,000	20,000	109	1,139,891	75,000
2020	56	230,613	35,000	3	4,000	4,000	94	424,723	188,824
2021	40	2,256,862	38,480	2	8,000	8,000	49	152,296	45,000
2022	30	97,382	42,460	42	656,250	656,250	47	164,068	80,384
2023	35	50,247 ³	46,185 ³	1	442,999	442,999	111	336,846 ³	129,326 ³
2024	84	906,461	41,000	5	20,840	22,000	127	334,181	133,075

¹ Permits that were cancelled or revoked after being issued were excluded.

² Average and median values were calculated based on “accepted value” indicated in the building permit. PV/battery permits that were combined with other types of building work were excluded from calculating the average or median permit values because the PV related cost could not be separated from other costs.

³ Revised from the previous reports

Table 7. Number of building permits issued for commercial PV and battery installation in 2024

Permit type	Total issued in 2024	By the month the permit was issued											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PV plus battery	84	6	7	4	6	5	4	16	8	4	9	6	9
Battery only	5	0	0	2	0	0	1	0	1	0	0	0	1
PV only	127	3	59	6	6	7	4	4	2	6	10	12	8

The following will be added later when required data becomes available.

Residential PV and battery installation in 2024 by neighborhood

Map 1, Location of permits for residential battery installation issued in 2024

Map 2. Location of permits for commercial battery installation issued in 2024