

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: July 19, 2017

Re: Briefing on renewables in the generator interconnection queue

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This briefing provides the status of renewable generation in the ISO's generator interconnection queue as of June 5, 2017. Key highlights include:

1. The current ISO queue contains approximately 58,000 MW actively seeking to interconnect to the ISO controlled grid. Renewables account for 39,387 MW, of which 17,114 MW has completed the study process and 22,273 MW are in various stages of the study process.
2. Changes in renewable project capacity in the queue since the February 2017 update include 192 MW of capacity that reached commercial operation, 10,689 MW of project withdrawals, 14,130 MW that entered in the cluster 10 window that was open during the month of April, and a decrease of 192 MW related to various project modifications.
3. ISO load serving entities estimate 3,300 MW of additional renewable capacity is needed by 2020 to meet the 33% Renewables Portfolio Standard mandate. Essentially all of the 3,300 MW needed has been procured by the California IOUs and is expected to reach commercial operation by 2020.
4. While not considered renewable generation, energy storage projects represent a significant portion of the capacity in the ISO queue, totaling 13,325 MW. The technologies include battery, pump storage, flywheel and rail energy storage.

DISCUSSION

The following graphs illustrate the renewables in the ISO queue from several perspectives.

Figure 1 shows the amount of renewable generation in the interconnection queue over time and breaks out the types of renewable capacity. During the January 2017 to June 2017 period, the queue experienced a net increase of 3,057 MW in renewable project capacity. The change is a result of 192 MW of capacity that reached commercial operation, 10,689 MW of project withdrawals, 14,130 MW of new cluster 10 projects, and a decrease of 192 MW related to various project modifications.

Figure 1

Change in renewable capacity in the ISO queue since June 2011

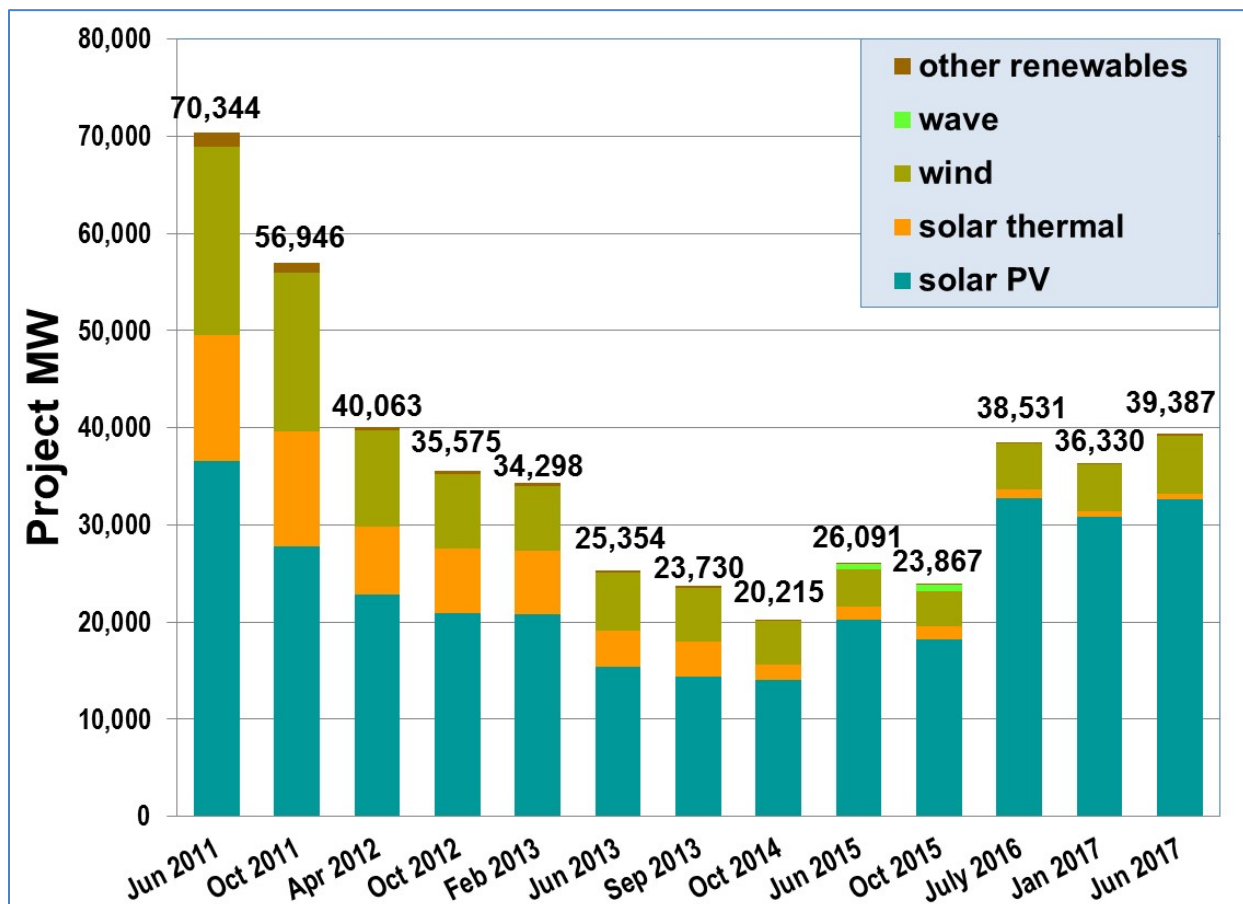


Figure 2 displays the amount of renewable capacity in the queue by study group and shows the capacity reductions within each study group. The active project portion of each bar, shown in blue, represents the June 2017 capacity that remains in each study group. Significant capacity (10,375 MW) withdrew from cluster 9 following the Phase I study process and 14,130 MW entered the new cluster 10.

Figure 2
Renewable generation capacity in the ISO queue by study group
(changes by study group since the January 2017)

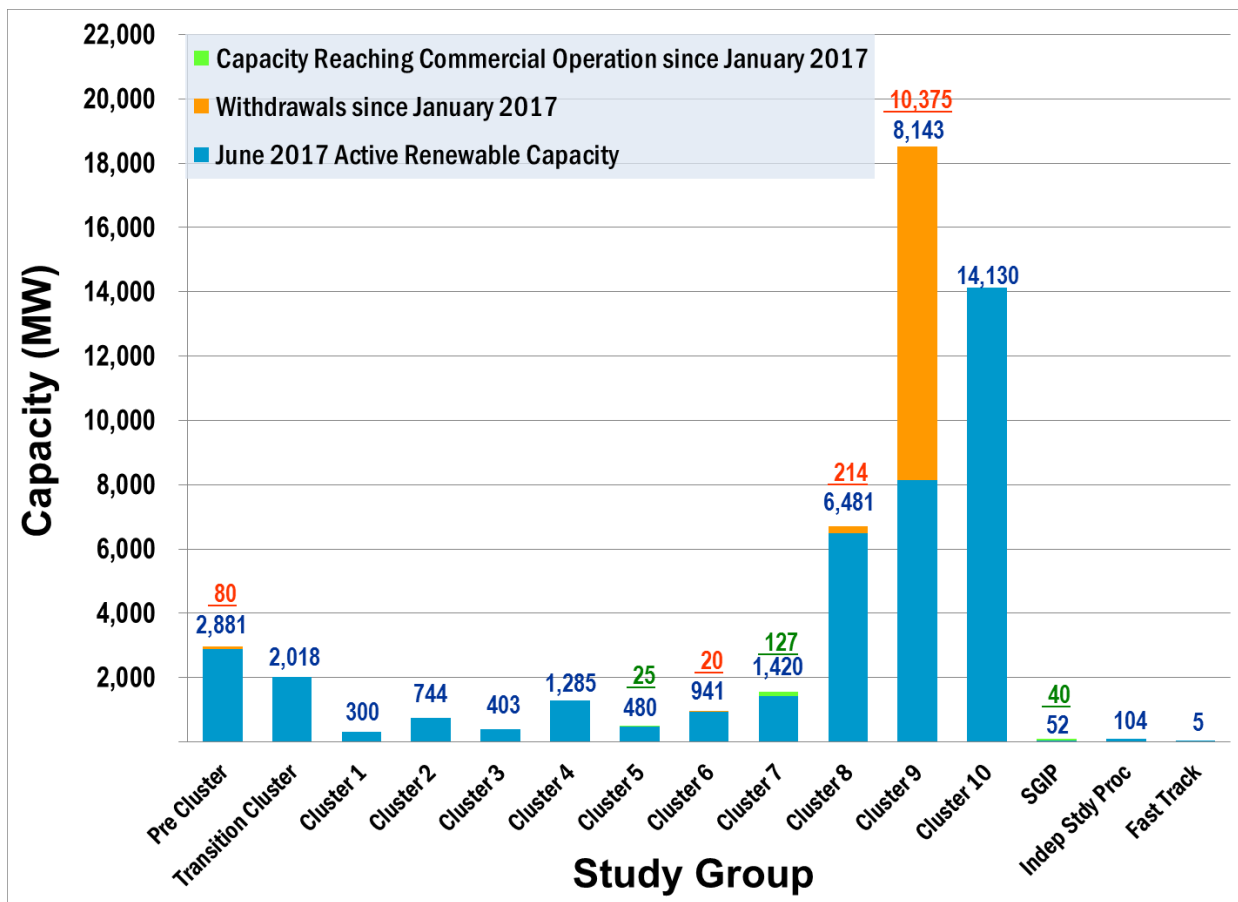


Figure 3 provides insight into the amount of active generator project capacity in the ISO queue by project size and type. Solar PV is the dominant generator technology for all size ranges. Figure 3 also provides a breakdown of the capacity in the ISO queue by the number of projects for each project size category. Projects in the 100 to 500 MW category make up 78% of project capacity.

Figure 3
MW of renewable projects in ISO queue
As of June 2017 by size and type

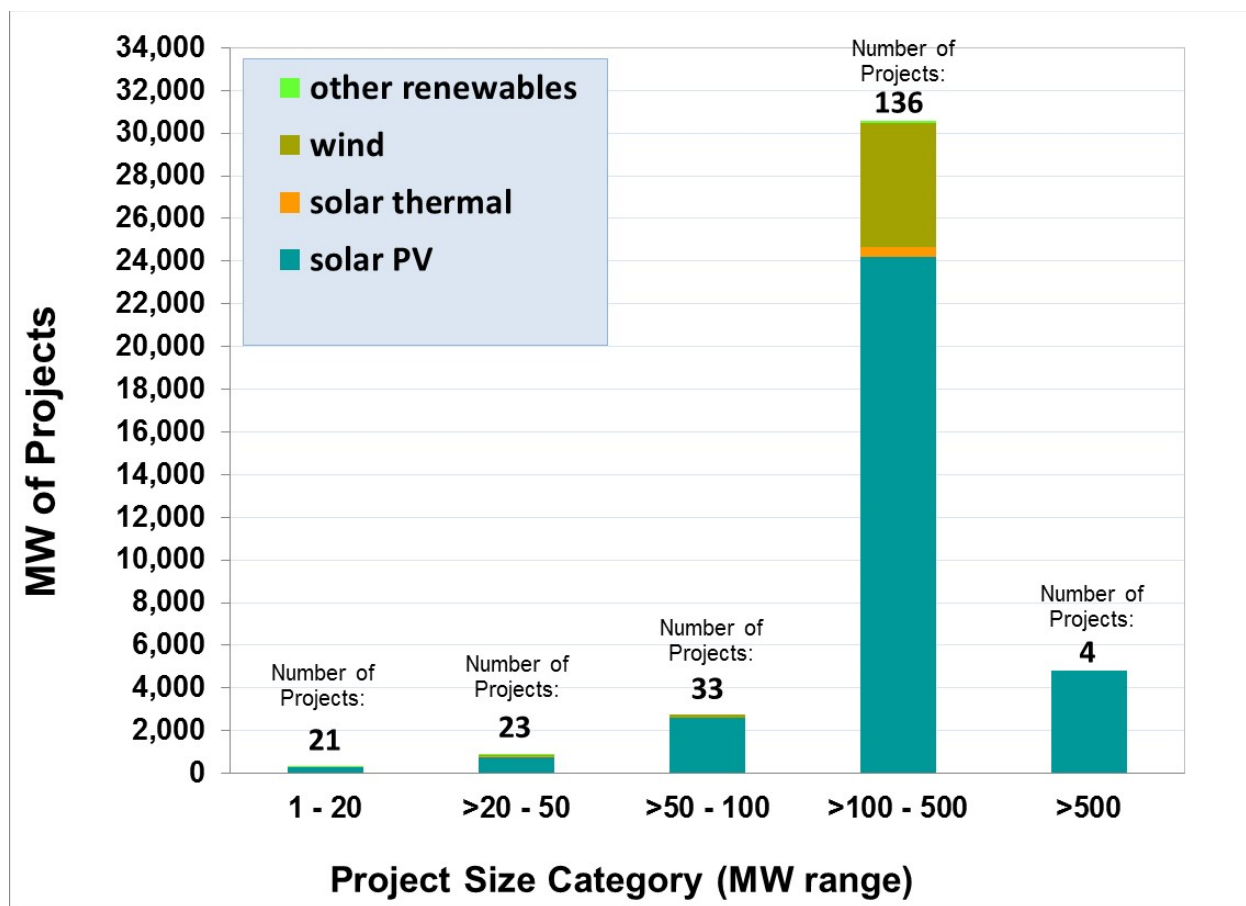


Figure 4 shows the historical and projected year 2020 build-out of renewable capacity by technology type based on projections from the investor owned utilities. The projected ISO connected renewable generation to be in operation in 2020 is 22,800 MW. The ISO currently has approximately 19,500 MW of operating renewable generation within its footprint, which leaves approximately 3,300 MW remaining to reach commercial operation between now and 2020. The majority of this amount is presently under contract with the three California IOUs.

Figure 4
Projected RPS capacity build-out through 2020
(IOU projections)

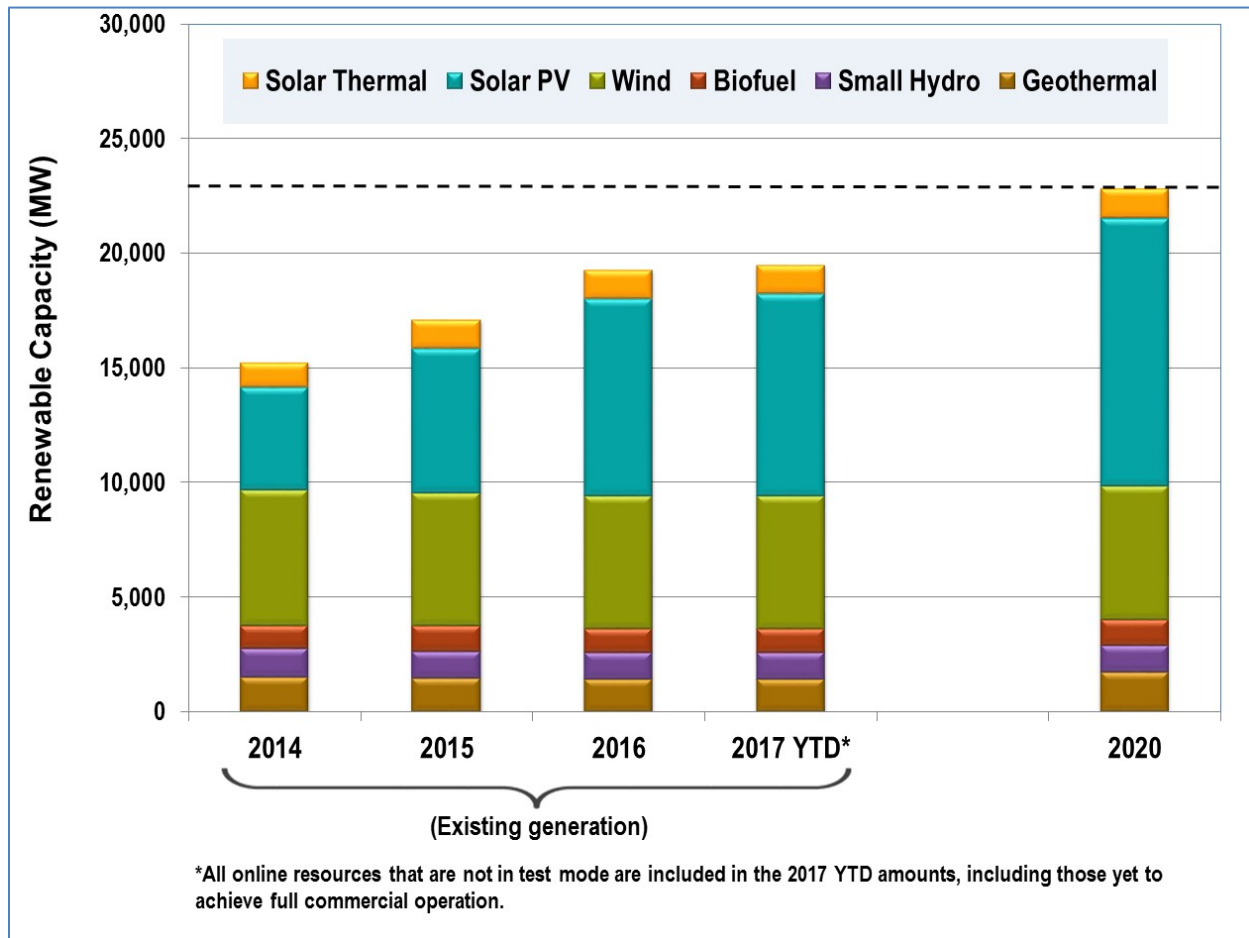


Figure 5 is a map of all projects in the generation interconnection queue as of June 2017 and shows the general location and capacity by project type, including conventional generation and storage project capacity. Some storage capacity is associated with other generation technologies within a single project, typically solar PV. In a number of these cases, the total project output is designed to not exceed the capacity of the solar portion of the project. However, in this table all technology types are provided at their full capability on a stand-alone basis (e.g. for a combined solar / storage project, both the solar capacity and the storage capacity are shown separately even though the total project output cannot exceed the rating of the solar portion of the facility). As a result, the total capacity of all projects shown here is greater than the total project capacity in the ISO generation interconnection queue.

Figure 5
ISO Queue Map – Conventional & Renewables
As of June 2017

