

# Memorandum

**To:** ISO Board of Governors

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

**Date:** August 24, 2016

**Re:** Update on renewables in the generator interconnection queue

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***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 July 28, 2016. Key highlights include:

1. The current ISO queue contains approximately 52,900 MW (38,500 MW renewable) actively seeking to interconnect to the ISO controlled grid.
2. Changes in renewable projects in the queue since the last generator interconnection queue update on October 9, 2015 include 1,137 MW of project capacity that reached commercial operation, 2,760 MW of project withdrawals, 18,541 MW that entered in the cluster 9 window that was open during the month of April, and one new 20 MW independent study project.
3. Compared to the amount of new generation needed to meet the year 2020 33% Renewables Portfolio Standard mandate, the ISO queue currently contains approximately eight times the additional capacity needed. Currently 34% of the project capacity has completed the study process. With the large amount of projects in cluster 8 and cluster 9 there are 25,428 MW in the study process.
4. While not considered renewable generation, energy storage projects represent a significant portion of the capacity in the ISO queue. Currently there are 73 energy storage projects totaling 8,650 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 October 2015 to July 2016 period, the queue experienced a net increase of 14,664 MW in renewable project capacity.

**Figure 1**  
**Change in renewable capacity in the ISO queue since June 2011**

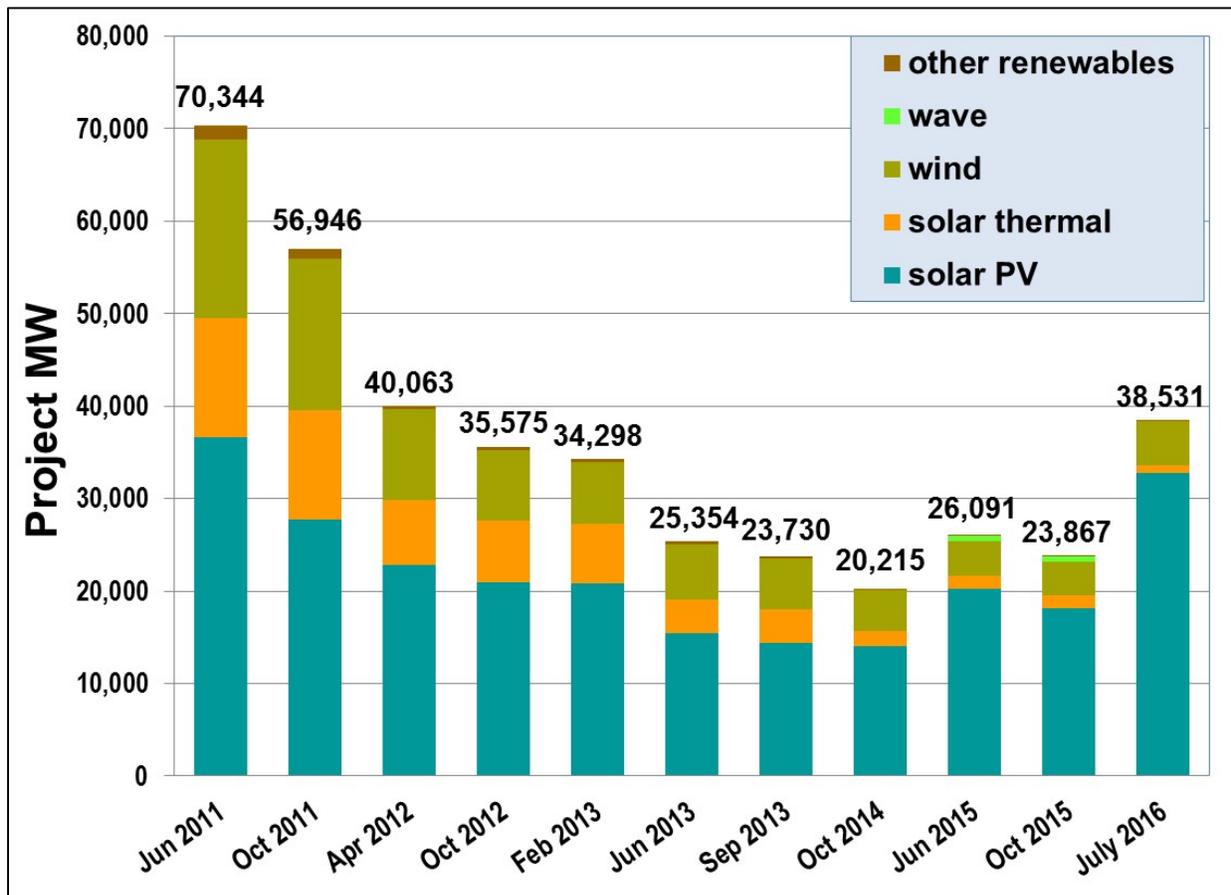


Figure 2 displays the amount of renewable capacity in the queue by study group and shows the capacity reductions within each study group. The active project portion of each bar, shown in blue, represents the July 2016 capacity that remains in the each study group. Since the October 2015 update, 3,897 MW of renewable capacity exited the queue, 2,760 MW coming from project withdrawals, and 1,137 MW from projects that reached commercial operation. All of the 18,541 MW shown for cluster 9 entered in the cluster 9 window that was open during the month of April, and one new 20 MW independent study project entered the queue during the period.

**Figure 2**  
**Renewable generation capacity in the ISO queue by study group**  
**(changes by study group since October 2015 update)**

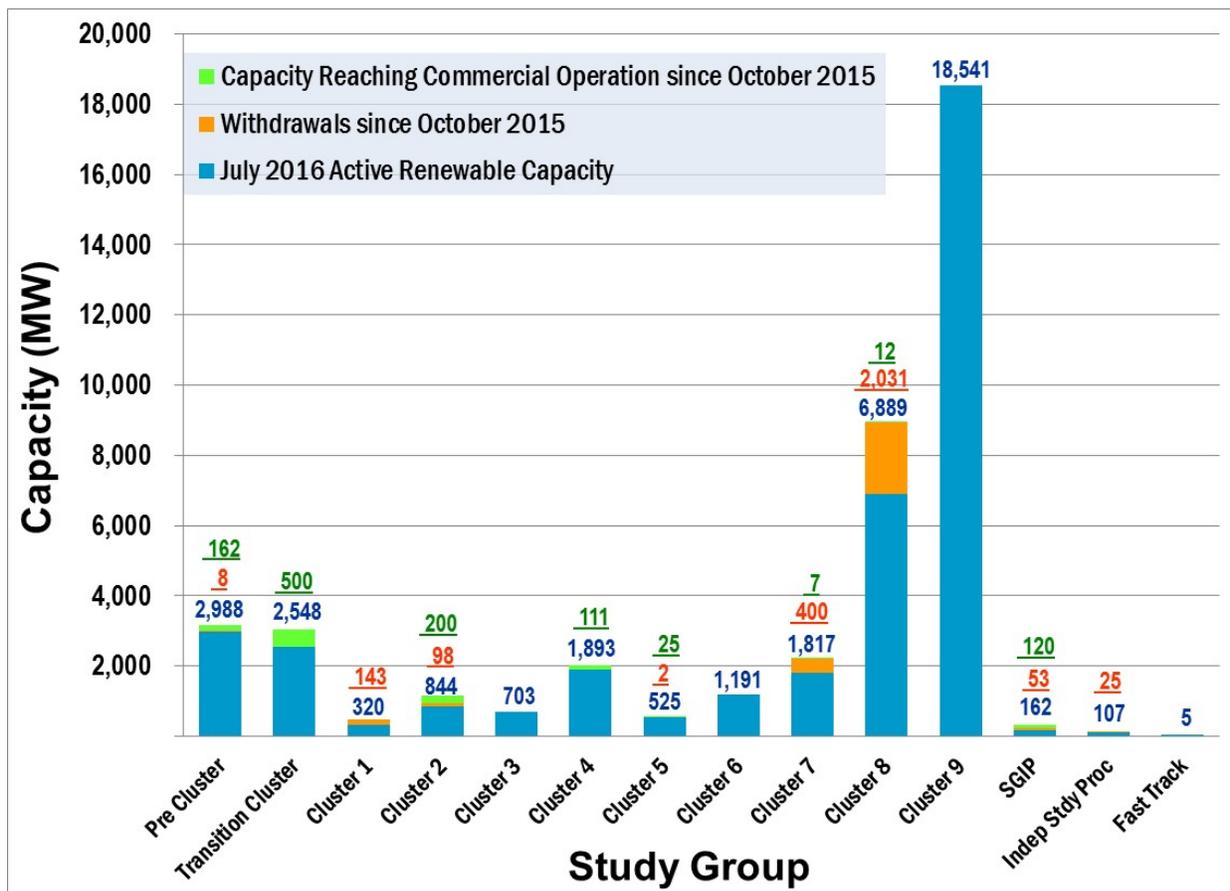


Figure 3 provides insight into the amount of generation capacity in the ISO queue by project size and type. Solar PV is the dominant generating technology for all size ranges. Figure 3 also provides a breakdown of the capacity in the ISO queue by the number of projects for each project size category. Projects in the 100 to 500 MW category make up 76% of project capacity.

**Figure 3**  
**MW of renewable projects in ISO queue**  
**As of July 2016 by size and type**

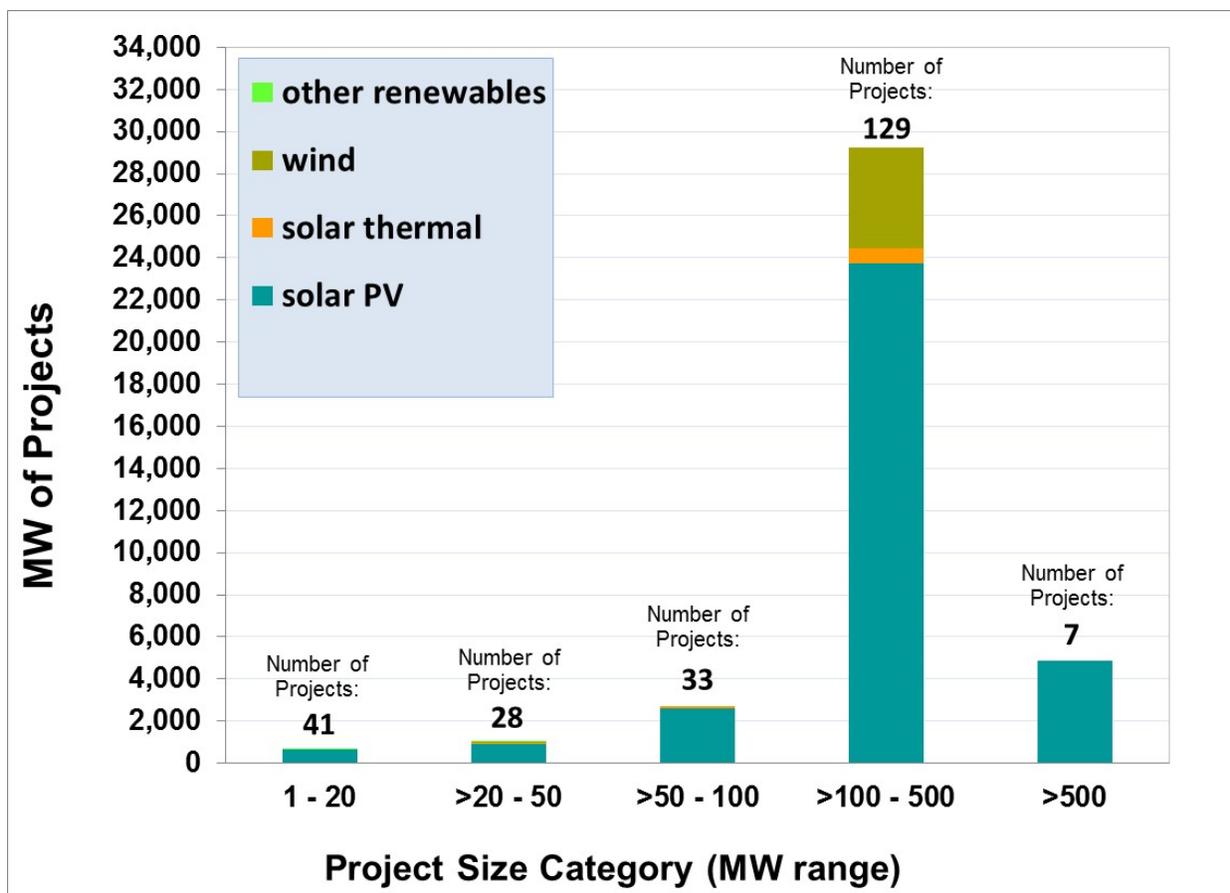


Figure 4 shows the projected build-out of renewable capacity by technology type based on projections from the investor owned utilities. The projected renewable generation to be in operation in 2020 is 22,800 MW and is expected to be somewhat greater than the actual amount needed to reach the 33% RPS requirement for that year. The ISO currently has approximately 18,100 MW of operating renewable generation within its footprint, which leaves approximately 4,700 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)**

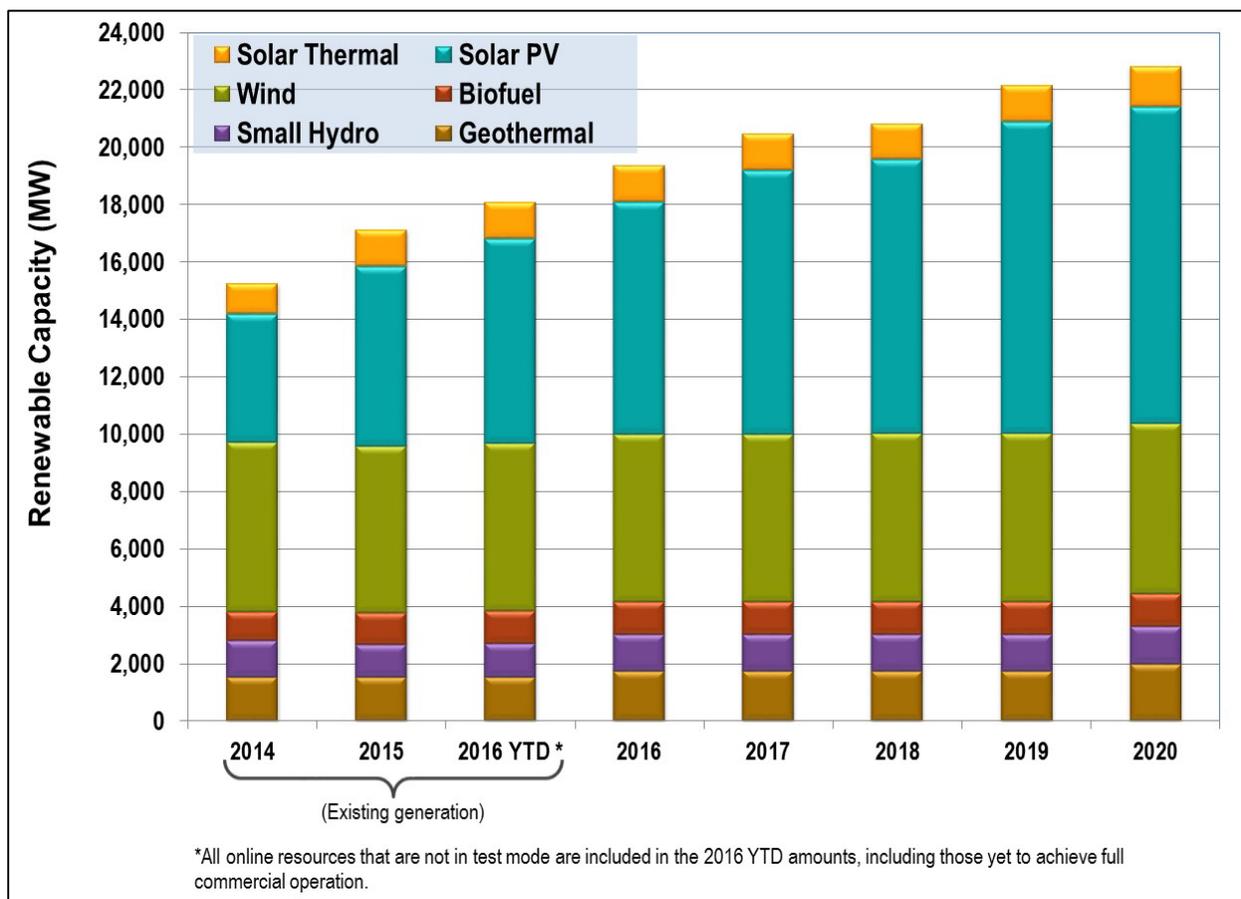


Figure 5 is a map of all projects in the generation interconnection queue as of July 27, 2016 and shows the general location and capacity by project type, including conventional generation and storage project capacity. Some storage capacity is associated with other generation technologies within a single project, typically solar PV. Where this is the case, the total project's net dependable capability may 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. As a result, the total capacity of all projects shown here is greater than the total project capacity in the ISO generation interconnection queue report.

**Figure 5**  
**ISO Queue Map – Conventional & Renewables**  
**As of July 27, 2016**

