

# Memorandum

**To:** ISO Board of Governors

**From:** Neil Millar, Vice President, Infrastructure & Operations Planning

**Date:** July 21, 2022

**Re:** Briefing on renewable and energy storage 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 and energy storage capacity in the ISO's generator interconnection queue as of June 2022. Key highlights include:

1. The Cluster 15 window for new interconnection requests was delayed from April 2022 to April 2023 to accommodate the April 2021 Cluster 14<sup>1</sup> "supercluster," So no new projects were added to the queue this year.
2. There is approximately 95,000 MW of renewable capacity and 141,000 MW of energy storage capacity in the queue.
3. Overall, the queue contains over 236,000 MW of renewable and energy storage capacity, with 62 percent of the project capacity in Cluster 14 and that will complete the study process by November 24, 2023.
4. Of the 373 interconnection requests received during the Cluster 14 receipt window, 339 are still active in the interconnection queue.
5. An excessive queue volume still seeking in-service dates in the near future that is creating challenges in getting the successful projects online. The volume seeking in-service dates of 2026 or earlier is over 10 times the amount of required procurement to meet CPUC preferred system plan targets. This reinforces the need for proactive procurement processes by load serving entities and completion and execution of the ISO's interconnection process enhancements initiative.

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<sup>1</sup> The fourteenth cluster study cycle conducted since the ISO introduced the cluster study process in 2008.

In addition to these key observations based on the interconnection queue, several other observations of industry developments provide context:

1. New capacity continues to be added to the grid, (as noted in earlier briefings to the ISO Board of Governors), 3,698 MW of installed capacity was added to the ISO grid in 2021, and we are on track to add an additional 3,062 MW by July 1. The increase from September 1, 2021 to September 1, 2022 is projected to be 2,751 MW Net Qualifying Capacity. While there have been modest delays of targeted in service dates in June and July, we remain on track for the September projected capacity levels.
2. The pace of new development will need to be sustained and accelerated in the years ahead. The CPUC's approved Preferred System Plan calls for over 26 GW of resources to be added by the end of 2025, and over 40 GW by the end of 2032, and these numbers are expected to grow as we transition to higher electrification of other energy sectors.
3. The ISO has continued to communicate information about available transmission capacity. The most recent update posted on May 31, 2022, identified over 5 GW of resources that could proceed with no network upgrades, almost 4 GW that can proceed based on transmission network upgrades under development, and over 20 GW dependent only on being added to existing or new remedial action schemes.

## **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 July 2021 to June 2022 period, the queue experienced a net decrease of 2,754 MW in renewable project capacity. The change is a result of projects that exited the queue through project withdrawals, projects reaching commercial operation, project downsizings, and various project modifications.

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

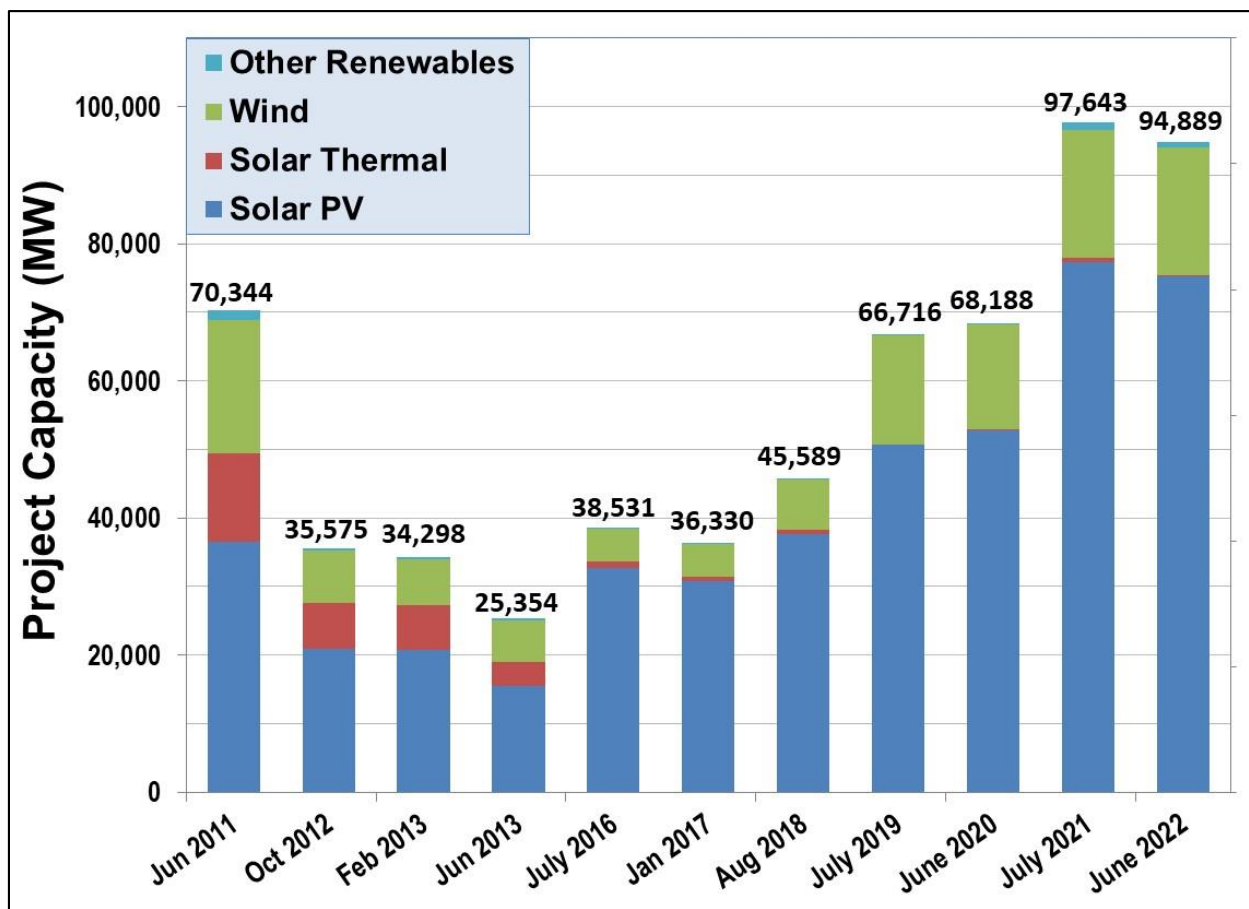
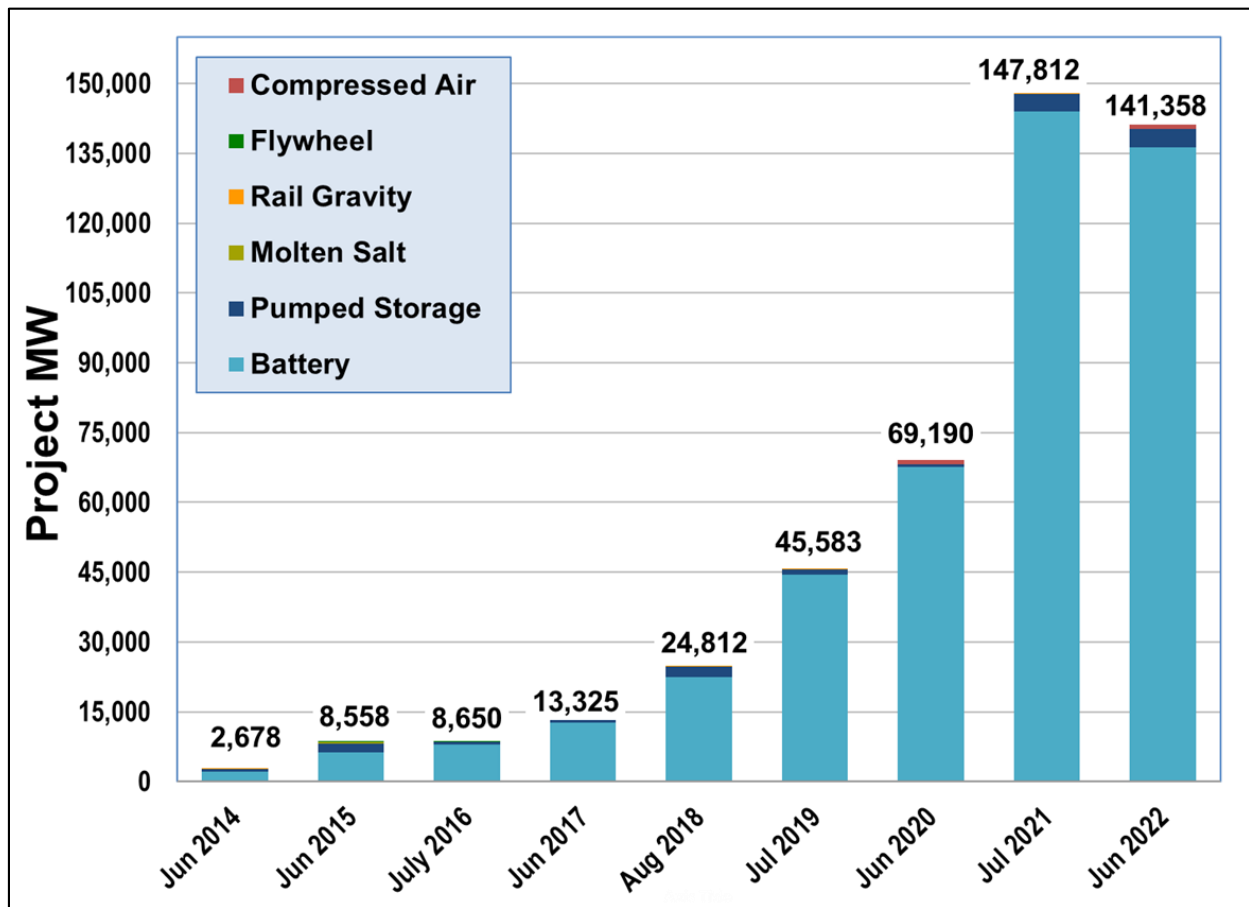


Figure 2 provides the current and historical levels of energy storage capacity in the queue. Nearly all of the storage totaling 141,358 MW are battery energy storage systems, which include stand-alone projects (49 percent) and capacity associated with hybrid projects (51 percent) where the battery energy storage system is a component of a project that includes renewable capacity, typically solar<sup>2</sup>. As with renewable capacity, the change in storage capacity is a result of projects that exited the queue through project withdrawals, projects reaching commercial operation, project downsizings, and various project modifications.

**Figure 2**  
**Change in energy storage capacity in the ISO queue since June 2014**



<sup>2</sup> The majority of hybrid projects are configured such that the capacity at the point of interconnection matches the capability of the largest technology component of the facility, whether that is renewable capacity or energy storage. Therefore, the renewable capacity and the energy storage capacity are not able to operate simultaneously.

Figure 3 shows the historical build-out of renewable capacity by technology type and a projection for the year 2030 based on the renewable capacity in the California Public Utilities Commission’s Base portfolio for 2022 through 2030. The ISO currently has approximately 26,640 MW of ISO grid-connected renewable generation in operation. The projected ISO connected renewable generation needed to meet the 60% renewable requirement by 2030 is approximately 46,000 MW.

**Figure 3**  
**Projected Renewable capacity build-out through 2030**  
**(CPUC Renewable Portfolio)**

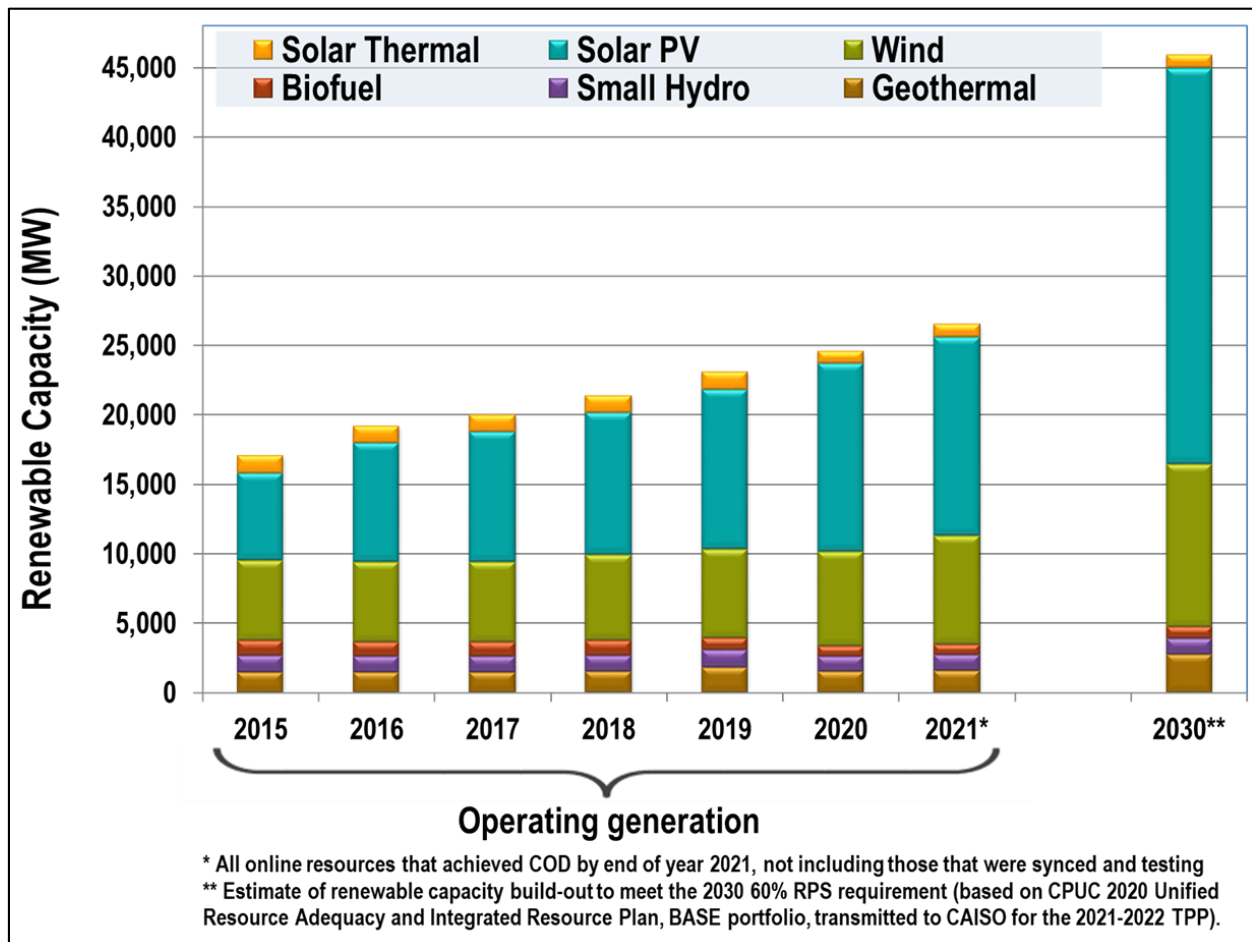
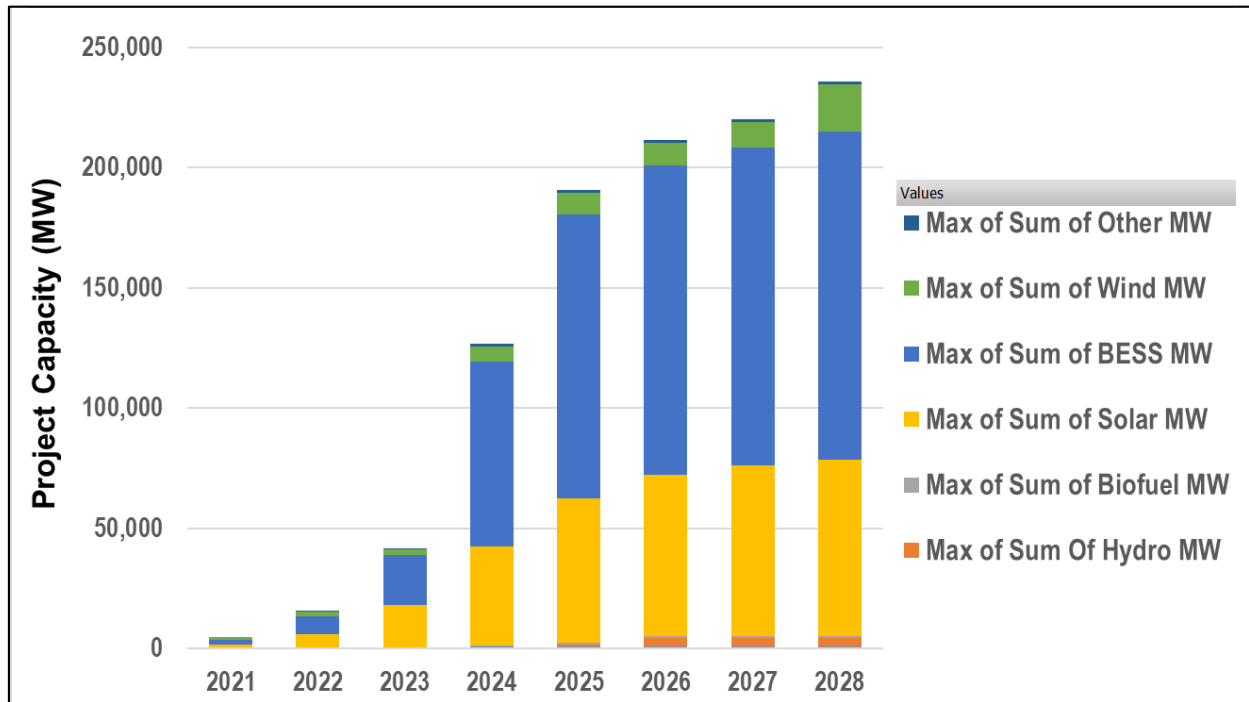


Figure 4 shows the capacity in the queue that is seeking to obtain a power purchase agreement and proceed to commercial operation, by technology type, including conventional technologies. The yearly capacity is based on each project’s current requested commercial operation date.

**Figure 4**

**Requested Capacity & Commercial Operation Date of Projects in the ISO Queue**



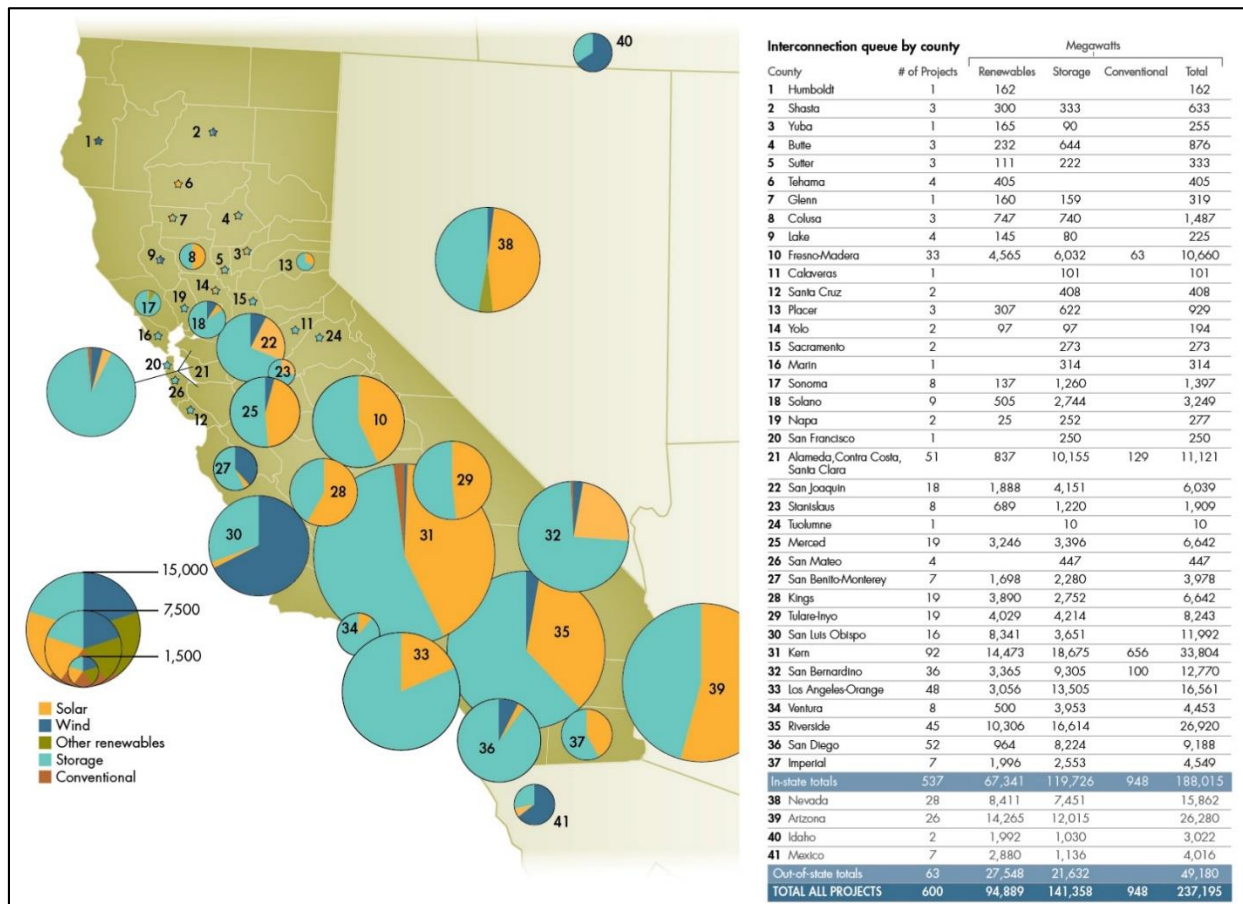
Notes:

- (1) This data includes resources that have achieved their commercial operation date as of June 15, 2022. Data beyond June 15 is generation information that is estimated based on the best available information to the ISO.
- (2) The capacity includes pseudo-tie and dynamic resources as they are considered to be within the ISO balancing authority area and can be shown for resource adequacy.

As less than 20 GW of new installed capacity is needed by 2026 to meet CPUC preferred system plan targets, the volume seeking in-service dates of 2026 or earlier is over 10 times the amount required. While the transmission system has considerable capacity available to meet the mid-term 2026 requirements, the competition among developers for that transmission capacity is intense. The excessive queue volume still seeking in-service dates in the near future that is creating challenges in getting the successful projects online. This reinforces the need for proactive procurement processes by load serving entities and completion and execution of the ISO’s interconnection process enhancements initiative.

Figure 5 is a map of all projects in the generation interconnection queue as of June 2022 and shows the general location and capacity by project type, including conventional generation. Some projects have more than one generation technology within a single project. In a number of these cases, the total project capability is greater than the capacity requested at the point of interconnection. These projects are typically configured such that the capacity at the point of interconnection matches the capability of the largest technology component of the facility. However, in this figure, all technology types are provided at their full capability on a stand-alone basis<sup>3</sup>. As a result, the total capacity of all projects shown here is greater than the total project capacity in the ISO generation interconnection queue at the point of interconnection.

**Figure 5**  
**ISO Queue Map – Conventional & Renewables**  
**As of June 2022**



<sup>3</sup> For example, accounting for the capacity of a combined solar / storage project, both the solar capacity and the storage capacity are shown separately even though in the majority of hybrid projects the output of the facility to the point of delivery is configured to not exceed the capability of the largest technology component of the facility.