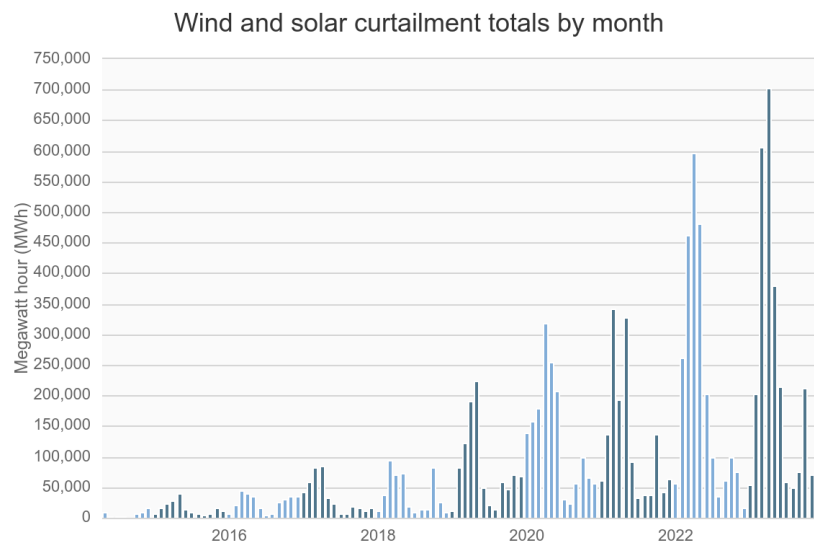


## No Wasted Opportunity with Malta’s LDES to Power the Grid 24x7 with Abundant Solar

Too much free, zero-emissions energy is a great problem to have. It presents an opportunity to capture and store this energy for use at a later, more valuable time of need, often correlating with when fossil resources would otherwise be dispatched.

Such is the problem/opportunity highlighted by the U.S. Energy Information Administration (EIA), which published a brief on the rising solar and wind curtailments in California.<sup>1</sup> According to EIA, the source of the vast majority of curtailments comes from utility-scale solar generation – unsurprising given their strong resource potential in the Golden State. Without sufficient energy storage at the right locations to take advantage of this opportunity, the problem will only get worse as California projects to continue to be a solar-heavy grid, with close to 70 GW of installed capacity by 2045 (compared to 23 GW of onshore and offshore wind).<sup>2</sup>



Data source: [California Independent System Operator](#)

This is where energy storage comes in. Already, California is the world leader in energy storage procurement, with an unprecedented 6.6 GW of storage in actual operations today.<sup>3</sup> While these storage resources support the critical net peak period between 4 and 9 PM and reduce renewable curtailment in the process, nearly all of the operational storage projects are four hours in duration.

<sup>1</sup> Aniti, Lori and Smith, Susanna. 30 October 2023. Solar and wind power curtailments are rising in California. U.S. Energy Information Administration. <https://www.eia.gov/todayinenergy/detail.php?id=60822>

<sup>2</sup> Gill, Liz, Gutierrez, Aleecia, and Weeks, Terra. 2021. 2021 SB 100 Joint Agency Report, Achieving 100 Percent Clean Electricity in California: An Initial Assessment. California Energy Commission. <https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity>

<sup>3</sup> California Energy Commission. 24 October 2023. California Sees Unprecedented Growth in Energy Storage, A Key Component in the State’s Clean Energy Transition. <https://www.energy.ca.gov/news/2023-10/california-sees-unprecedented-growth-energy-storage-key-component-states-clean>

This limits the potential to shift otherwise curtailed renewable generation to more hours of the day, especially as the state moves toward full zero-carbon electricity closer to 2045.

To achieve these long-term decarbonization goals, long-duration energy storage (LDES) like Malta's 10+ hour pumped heat energy storage (PHES) system can offer greater portfolio buildout efficiencies. In an E3 study conducted for the California Energy Commission (CEC), LDES was found to significantly reduce renewable curtailment in highly renewable grids by 94% on an annual basis. It also reduces the solar overbuild by 90 GW in scenarios where in-state combustion resources are retired, creating both investment and operational cost savings.<sup>4</sup> Surplus renewable generation can not only support intra-day needs but also support continuous dispatch across days and weeks. In so doing, LDES can convert intermittent renewables into fully dispatchable and flexible resources.

Notably, compared to the more intuitive case of curtailment due to supply exceeding demand, the EIA brief also discussed the greater source of renewable curtailment as congestion, which is tied to the insufficient transmission capacity to accommodate solar generation. To address these concerns, the CAISO approved a historic amount of transmission projects in the most recent 2022-2023 cycle, many in the solar-rich Southern California areas.<sup>5</sup> Combined with greater regionalization efforts, these transmission investments will enable the deliverability of greater amounts of renewable generation forecasted ahead and relieve said congestion.<sup>6</sup> It is well known in the electric resource development and planning communities, however, that actual transmission development and permitting to reach the actual in-service date takes 12 years or more historically.<sup>7</sup> More can be done to improve upgraded and new transmission timelines, but few, quick silver-bullet solutions appear to be in sight at this time, considering local and multi-stakeholder buy-in and approval is needed for any major investment.

Again, this is where LDES as a transmission asset can mitigate risks to timely transmission buildout and relieve congestion-related curtailment. To address these concerns, however, LDES for this purpose would need to be built at scale and in accelerated timeframes, considering that the EIA brief clearly underscores how this is very much a present-day issue that is only growing in magnitude. In this regard, LDES solutions, like Malta, offer great advantages in leveraging existing supply chains and in using mature components. The growing level of renewable curtailment highlights the need for California to continue its environmental leadership and look to scalable LDES solutions to avoid wasting its abundance of renewable generation and use it to support cost-effective, reliable, round-the-clock clean power.

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<sup>4</sup> Go, Roderick et al. 9 May 2023. Assessing the Value of Long Duration Energy Storage. California Energy Commission. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=250157>

<sup>5</sup> California ISO. 18 May 2023. CAISO 2022-2023 Transmission Plan approved. News Release. <https://www.caiso.com/Documents/caiso-2022-2023-transmission-plan-approved.pdf>

<sup>6</sup> Tsoukalis, John, Pfeifenberger, Hannes, and Bennett, Evan. 30 August 2023. Extended Day-Ahead Market Benefit Study. California ISO. [https://www.caiso.com/Documents/EDAM\\_Forum\\_Brattle\\_Slides\\_2023-08-30.pdf](https://www.caiso.com/Documents/EDAM_Forum_Brattle_Slides_2023-08-30.pdf)

<sup>7</sup> Falkenberg, Nelson. 30 May 2023. California's transmission permitting: Slowest in the West? Clean Air Task Force. <https://www.catf.us/2023/05/californias-transmission-permitting-slowest-in-the-west/>