Ancillary Market Saturation in CAISO and ERCOT:
A Series of Predictable Events

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Ancillary services have been a key component of storage revenue stacks since batteries began coming online, turbocharging returns for some operating projects. However, this turbocharger has already started to wane in CAISO and ERCOT and serves as a harbinger for ancillary decline in other markets. This decline is consistent with Ascend Analytics' forecast of ancillary service prices, highlighting the growing importance of geographic location and bidding strategy as value drivers for storage projects as revenues shift from ancillary services to energy arbitrage.

The decline in ancillary prices is caused by the shallowness of the ancillary service markets, with batteries quickly becoming price-setters as their deployment grows. With ancillary service prices typically reflecting opportunity costs, prices can drop to near-zero during the portions of the day when batteries neither want to charge nor discharge and thus have no opportunity cost.

Market saturation rates must be analyzed to forecast ancillary market prices

Ascend Analytics has been incorporating this expected market saturation in its ancillary price forecasts for years, and these effects are now observable in realized market prices. The saturation is shown most clearly by the decoupling between energy and ancillary prices that has occurred over the past two years in CAISO and over the last year in ERCOT. Figure 1 shows monthly average energy and ancillary prices and their ratios in CAISO and ERCOT for the primary ancillary service met by batteries in each respective market in our analysis: regulation in CAISO and Responsive Reserve Service (RRS) in ERCOT. A rolling average of the energy to ancillary price ratio indicates that ancillary prices began moving down relative to energy prices beginning in early 2021 in CAISO and summer 2022 in ERCOT.

Figure 2 shows that, in both markets, the decoupling began when the installed storage capacity approached the size of the ancillary market: ~1 GW for regulation in CAISO, and ~1.5 GW for the portion of RRS in ERCOT that is not served by interruptible load. The ancillary price depression in ERCOT is arriving faster than previously forecasted, which is likely driven in part by online batteries following inefficient operational strategies that keep them in ancillary markets despite declining ancillary prices and substantial arbitrage opportunity in real-time energy prices.

Figure 1: Energy and ancillary prices in CAISO (top) and ERCOT (bottom)

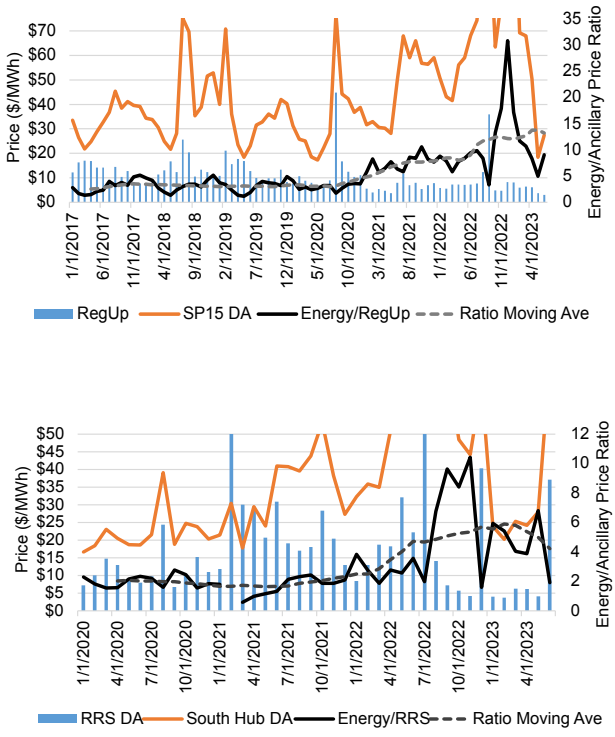


Figure 2: Energy/ancillary price ratio as a function of installed storage capacity as a % of ancillary requirements in CAISO and ERCOT, with the ratio normalized to the average value before battery deployment began growing

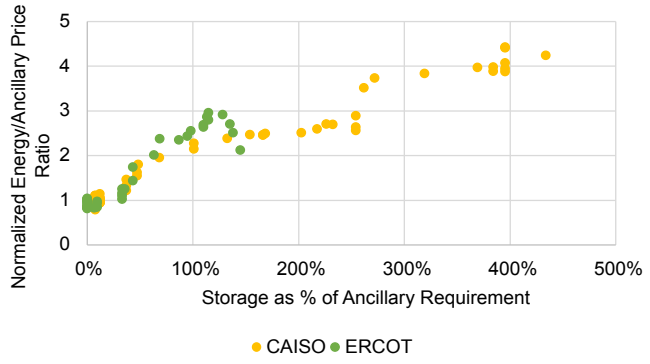
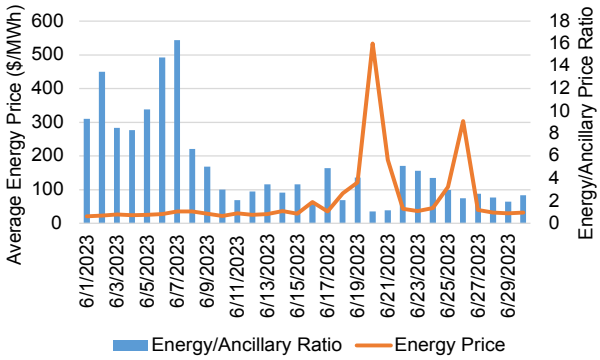


Figure 3: ERCOT RRS prices before and after the introduction of ECRS on June 10



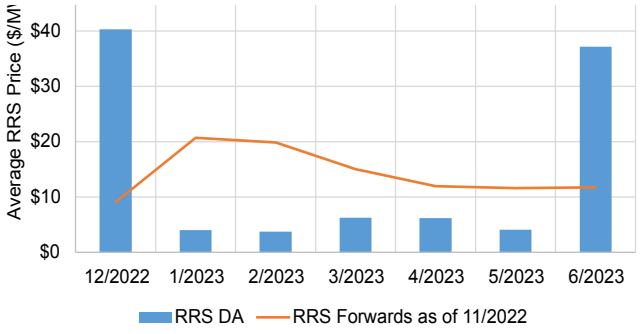
ERCOT Contingency Reserve Service (ECRS) should slow the rate of saturation by increasing demand for ancillary service

The introduction of the ERCOT Contingency Reserve Service (ECRS) on June 10, 2023 increased the demand for ancillary services in ERCOT that can be served by batteries. This change should lead to some uplift in RRS and ECRS prices as two-hour batteries increasingly serve ECRS. With the introduction of ECRS being closely followed by a Texas heat wave and elevated power prices, its effect thus far is difficult to discern. However, Figure 3 shows that ancillary prices rose relative to energy prices after ECRS was introduced and remained higher even after energy prices returned to previous levels.

The heat wave also illustrates that extreme conditions can still drive recovery in the ancillary market. This impact can be seen in Figure 1 when both energy and ancillary prices ran high in ERCOT during December 2022 (Winter Storm Eliot) and June 2023 (heat wave), and in CAISO during September 2022 (heat wave). In these extreme circumstances, energy/ancillary price ratios return to something close to their historical levels as increasing supply resources are needed to serve energy, leaving the entire system tight.

This potential for high ancillary prices during extreme events may also be driving elevation in market forwards for ancillary services in ERCOT, which Figure 4 shows have usually been significantly higher than spot prices. Forwards far exceeded spot prices in most months, but in months with extreme conditions (December 2022 and June 2023), spot prices significantly exceeded forwards for both energy and ancillary services. For the seven months shown in Figure 4, the average price of the ancillary (RRS) forwards ($14.30) was nearly identical to the average realized price ($14.55), indicating that the market may be pricing in the potential for extreme events to cause large price swings in ancillary markets. To the extent that ancillary forwards in ERCOT are liquid and can be contracted, they provide a valuable revenue hedge with most months far exceeding the value of actually serving the ancillary product.

Figure 4: Comparison of realized RRS prices in 2023 in market forwards as of late November 2022



Moving Forward: Active market participation and bidding strategy are critical to maximizing revenue

The declining prices observed in these ancillary markets, which have been anticipated by Ascend Analytics' Market Intelligence forecasts, illustrate the importance of having an active market participation and bidding strategy, such as that provided by Ascend Analytics' Smartbidder™, which helps maximize operating asset revenue across products. Moreover, these changes have long been included in Ascend Analytics forecast to occur on this timeline and don't spell the end of solid returns for storage but rather a shift in value toward location and spot energy price revenues.

Looking for a more reliable way to develop bid strategies or asset valuations that leverage physical market conditions, forecasts, probabilities of future events and risk metrics?

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