Memorandum

To: ISO Board of Governors

From: Eric Hildebrandt, Executive Director, Market Monitoring

Date: September 11, 2019

Re: **Department of Market Monitoring update**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo provides highlights of market performance in the summer months of July and August of 2019. Market prices have been relatively low and stable this summer due to a combination of favorable market and system conditions. Natural gas prices dropped by about 45 percent and have been much less volatile than in summer 2018. Summer loads were very moderate with system loading peaking at 2,000 MW less than the ISO's 1-in-2 year forecast. Hydro supplies available for the summer months were up significantly, and few major generation and transmission outages have occurred so far. These favorable market conditions have helped the overall performance of the ISO energy markets to remain highly competitive this summer.

Overall market performance

The average cost per megawatt-hour of load for July and August 2019 decreased to about $37/MWh from nearly $69/MWh in the third quarter of 2018. This 46 percent decrease in wholesale electric prices was driven primarily by a 45 percent decrease in natural gas prices compared to summer 2018. After adjusting for changes in gas costs and greenhouse gas prices, wholesale electric costs decreased by about 14 percent from 2018. In addition to lower natural gas costs, wholesale energy costs were low due to low load, increased production from hydroelectric and solar resources, and low rates of congestion.

Figure 1 shows total estimated wholesale costs per megawatt-hour of ISO system load from the third quarter of 2018 through August 2019. Wholesale costs are provided in nominal terms (blue bar), and normalized for changes in natural gas prices and greenhouse gas compliance costs (gold bar). The green line represents the annual average daily natural gas price including greenhouse gas compliance.

Figure 1. Total quarterly wholesale costs per MWh of load (Q3 2018 – August 2019)

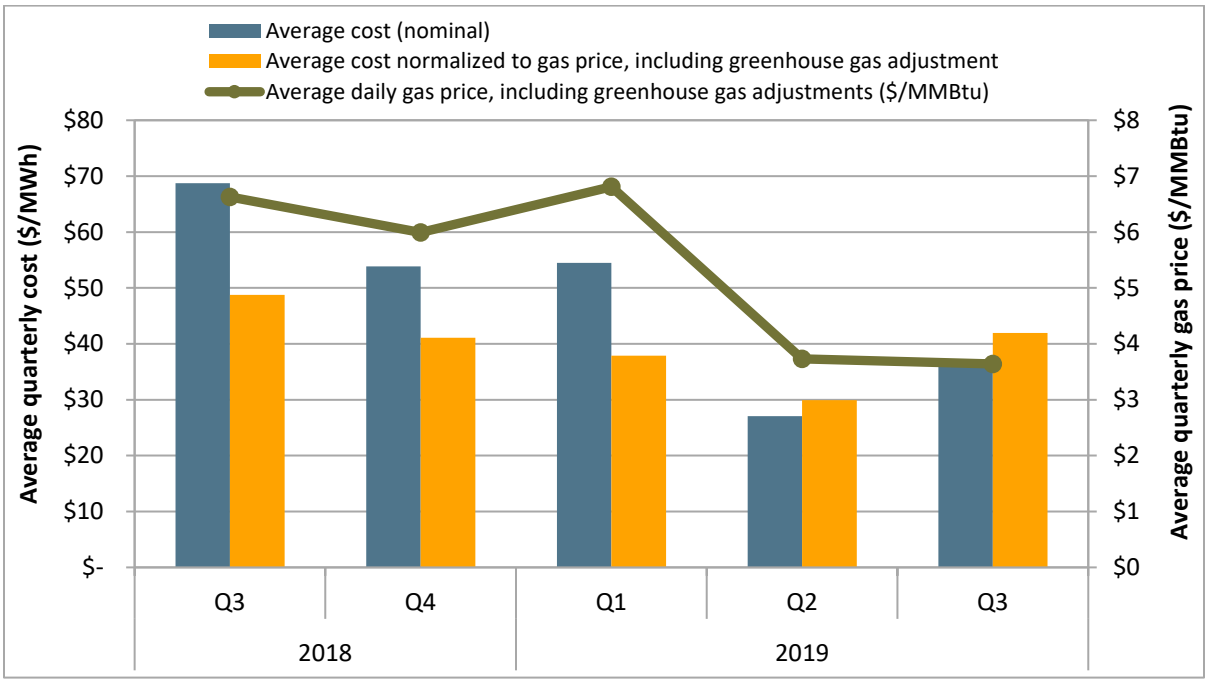


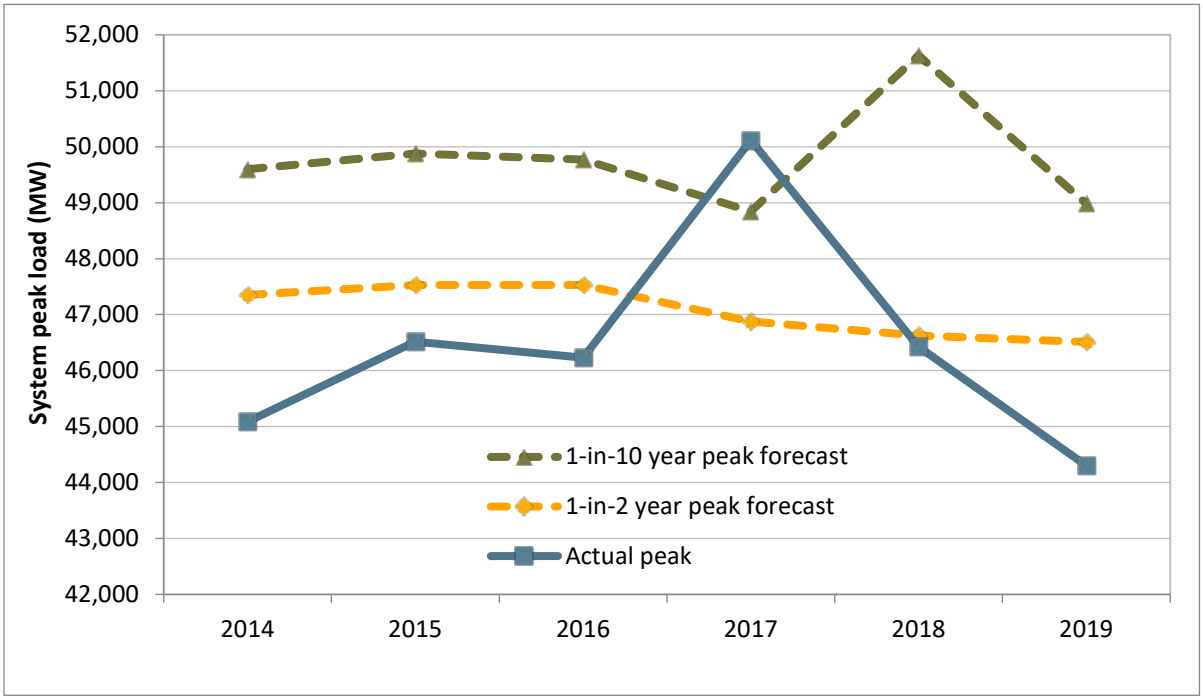
Table 1. Average wholesale energy costs per MWh (2014-2018)

	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Change Q3 2018-Q3 2019
Day-ahead energy costs	$ 64.52	$ 51.46	$ 52.24	$ 23.73	$ 34.93	$ (29.59)
Real-time energy costs (incl. flex ramp)	$ 0.69	$ 0.01	$ 0.25	$ 1.23	$ 0.75	$ 0.06
Grid management charge	$ 0.43	$ 0.43	$ 0.42	$ 0.42	$ 0.42	$ (0.01)
Bid cost recovery costs	$ 1.27	$ 0.49	$ 0.56	$ 0.48	$ 0.69	$ (0.58)
Reliability costs (RMR and CPM)	$ 0.63	$ 0.90	$ 0.06	$ 0.06	$ 0.03	$ (0.59)
Average total energy costs	**$ 67.54**	**$ 53.29**	**$ 53.53**	**$ 25.92**	**$ 36.82**	**$ (30.72)**
Reserve costs (AS and RUC)	$ 1.19	$ 0.53	$ 0.94	$ 1.14	$ 0.45	$ (0.74)
Average total costs of energy and reserve	**$ 68.73**	**$ 53.83**	**$ 54.47**	**$ 27.06**	**$ 37.27**	**$ (31.46)**

System loads

Summer loads appear to have peaked at about 44,301 MW on August 15.[1] As shown in Figure 2 below, this peak is more than 2 GW below the 1-in-2 year load forecast (46,511 MW) and more than 4.5 GW below the 1-in-10 forecast peak (48,979 MW). Although annual system load has been decreasing since 2011, the system can peak significantly higher as it did in 2017 when system loads reached 50,116 MW.

Figure 2. Actual load compared to planning forecast



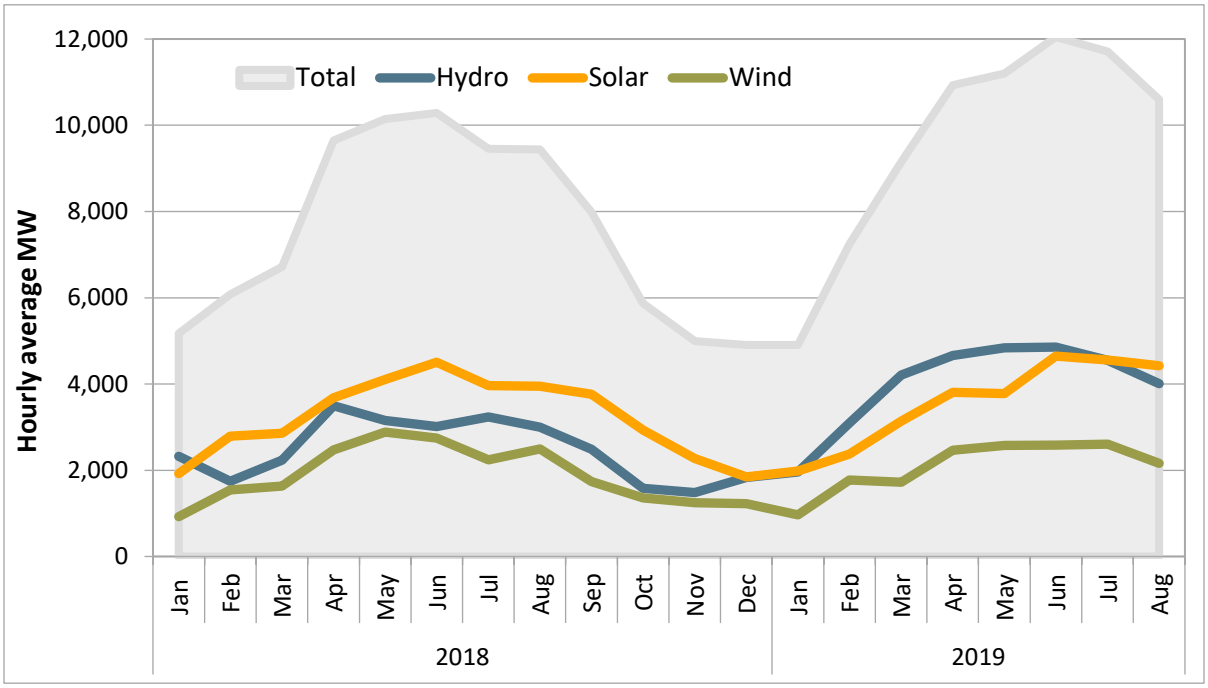
Increased renewable generation

Total generation from hydroelectric, solar, and wind resources increased through the end of August 2019 compared to the same period in 2018 (see Figure 3). This increase was primarily due to increased snow melt and therefore greater availability of hydroelectric production. As of April 1, the statewide weighted average snowpack in California was 175 percent of normal compared to 58 percent of normal on April 1, 2018.

Hydroelectric production in the second quarter increased by roughly 49 percent compared to 2010. Hydroelectric production in July and August was about 37 percent above the same months in 2018. Wind and solar production in July and August was about 9 percent above production in the same months in 2018.

[1] http://www.caiso.com/Documents/MonthlyStats-August2019.pdf.

Figure 3. Hydro, solar, and wind generation by month (2018-2019)



Energy prices

In the second quarter of 2019, average quarterly day-ahead prices were significantly lower than both 15-minute and 5-minute prices for the first time since 2014. Average second quarter prices decreased substantially from the first quarter to levels similar to the second quarter of 2018, driven by decreased gas prices and increased hydroelectric and renewable production (Figure 4).

Day-ahead prices remained higher than real-time prices in most hours, but average quarterly real-time prices were driven up by real-time price spikes in April and June. Prices in July and August were low relative to recent peak summer months and appear to have converged on a monthly average basis.

Figure 4. Average monthly system marginal energy prices