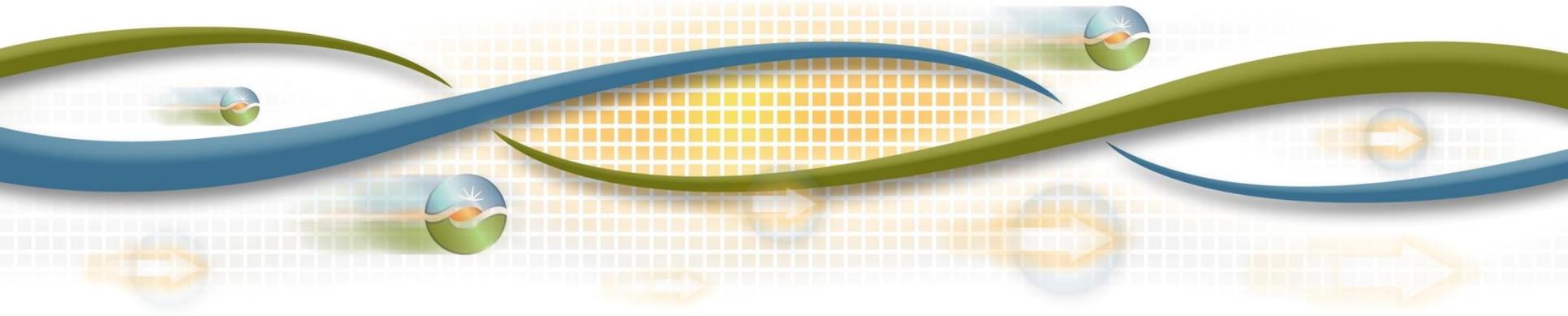




# 2016 Annual Report on Market Issues and Performance

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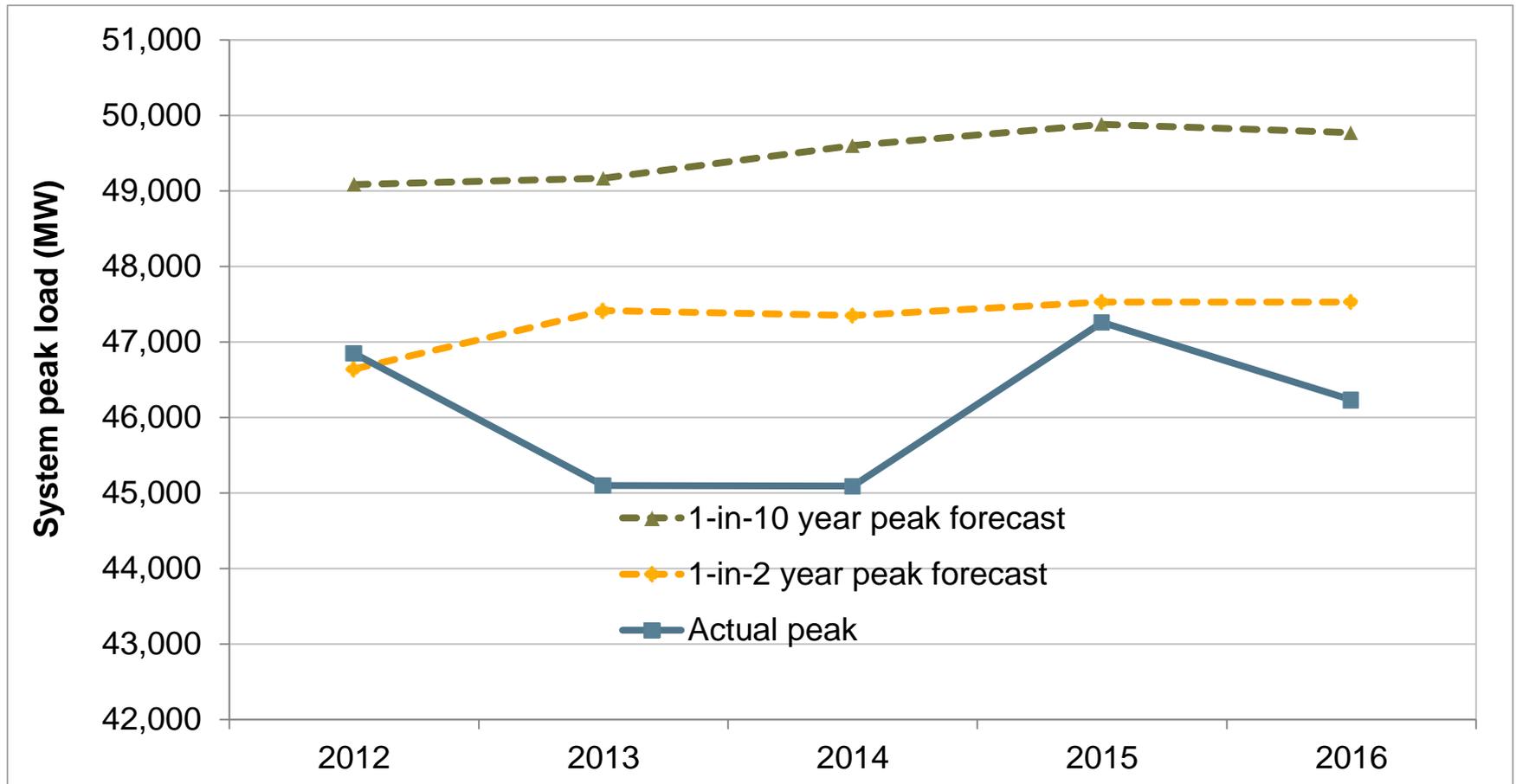
Web Conference  
May 24, 2017



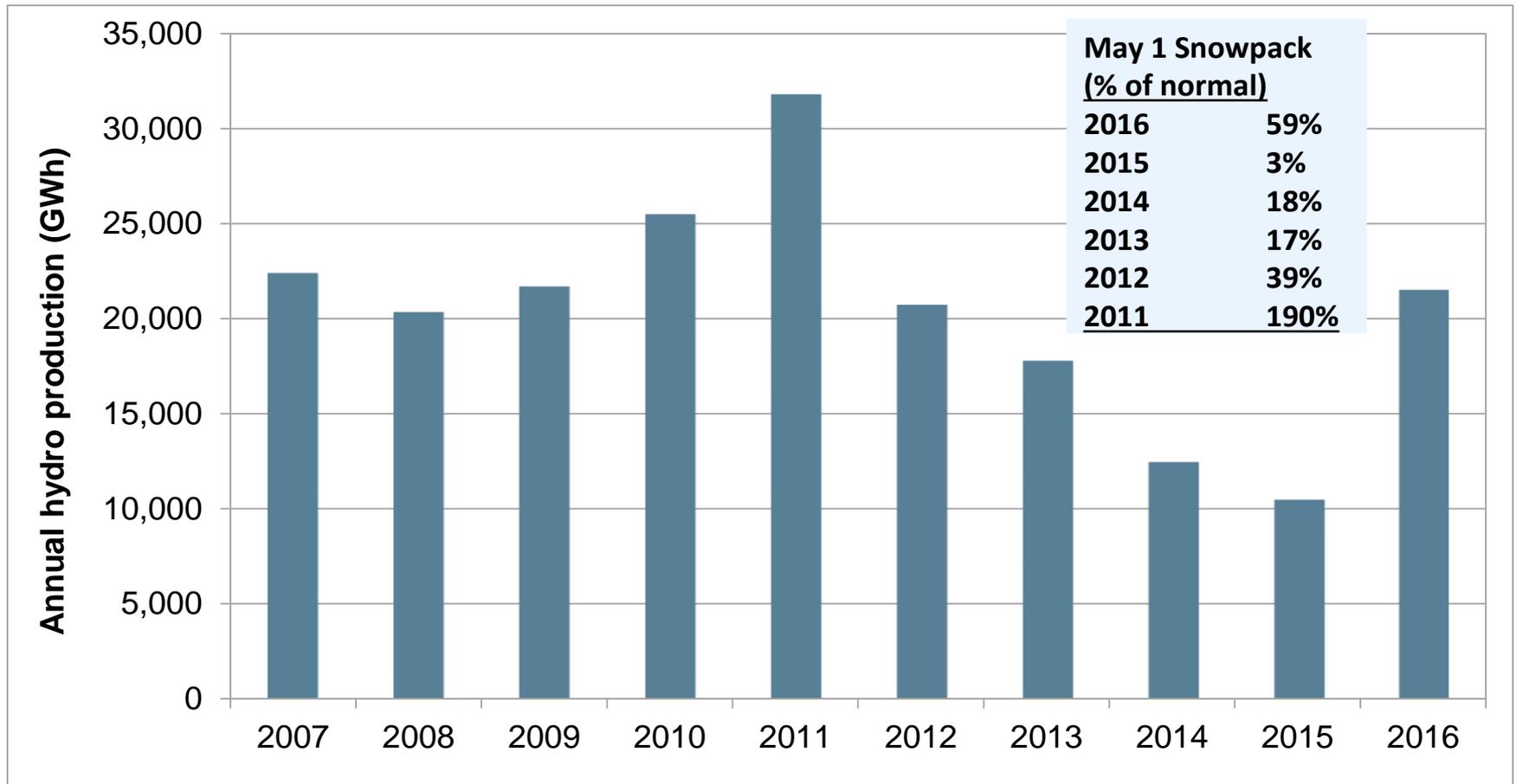
# Presentation outline

- Annual report highlights
  - Demand and supply conditions
  - Wholesale market performance
  - EIM Performance
- Key recommendations

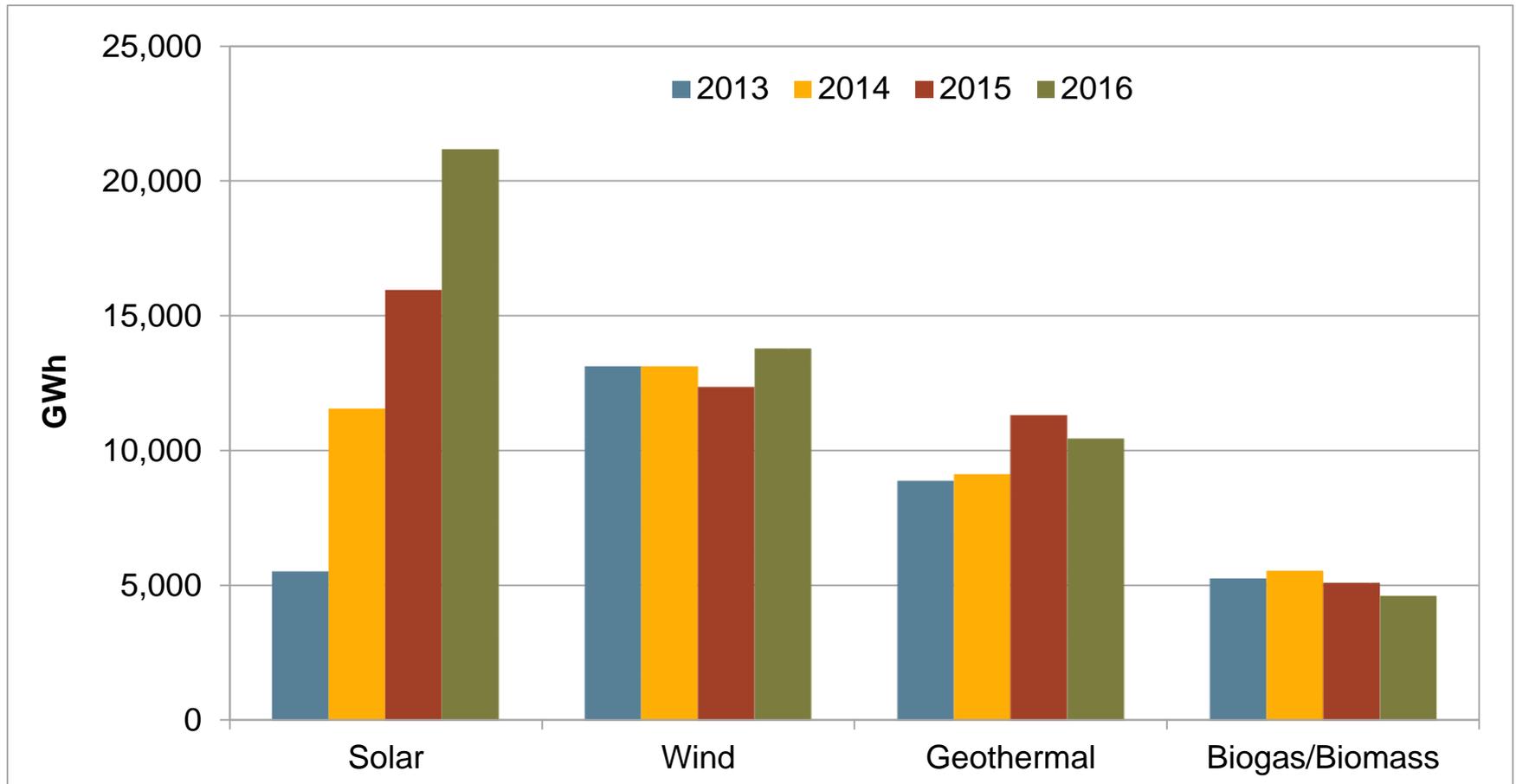
The peak load in 2016 was moderate and did not reach the 1-in-2 year forecast.



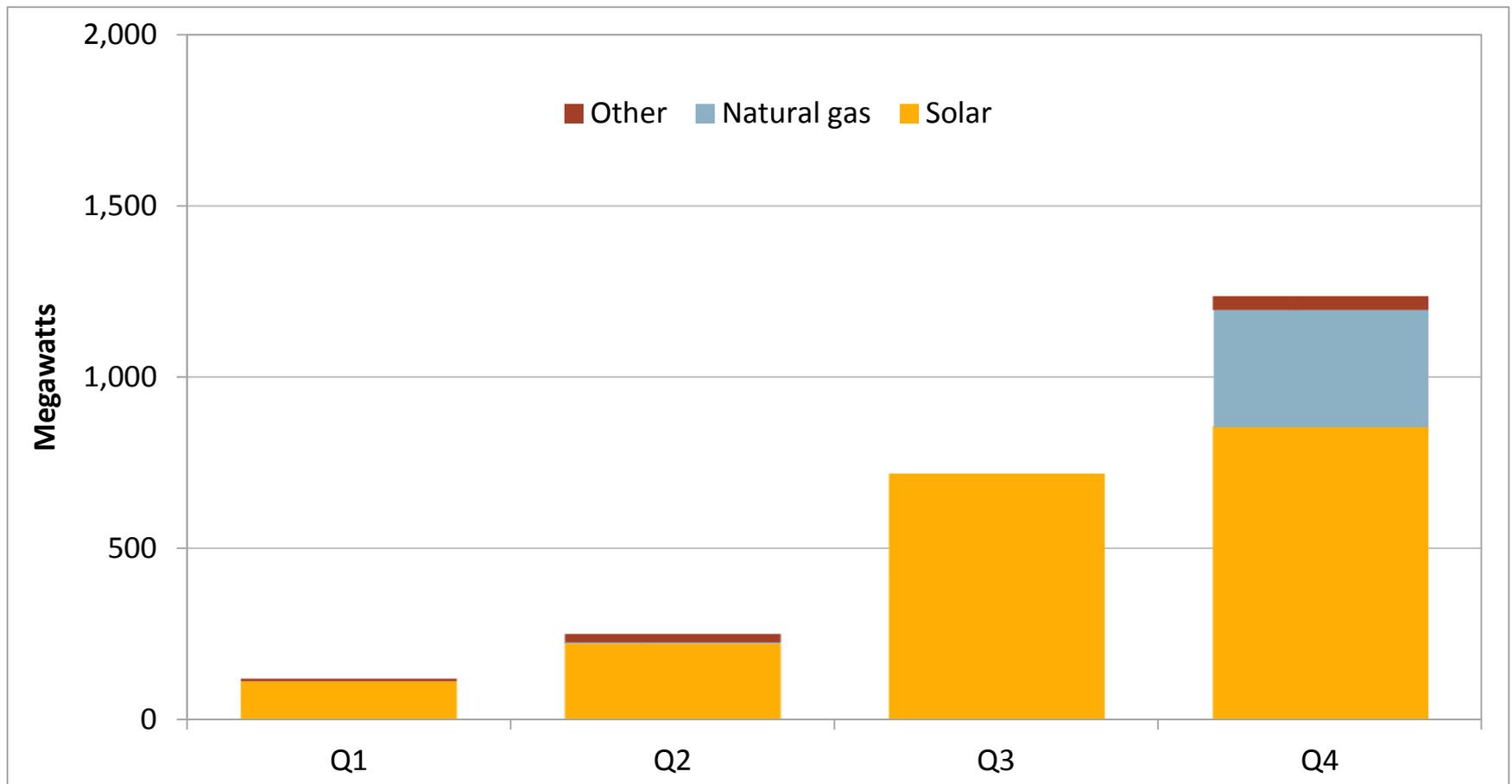
# In-state hydro-electric generation and snowpack improved from previous recent years.



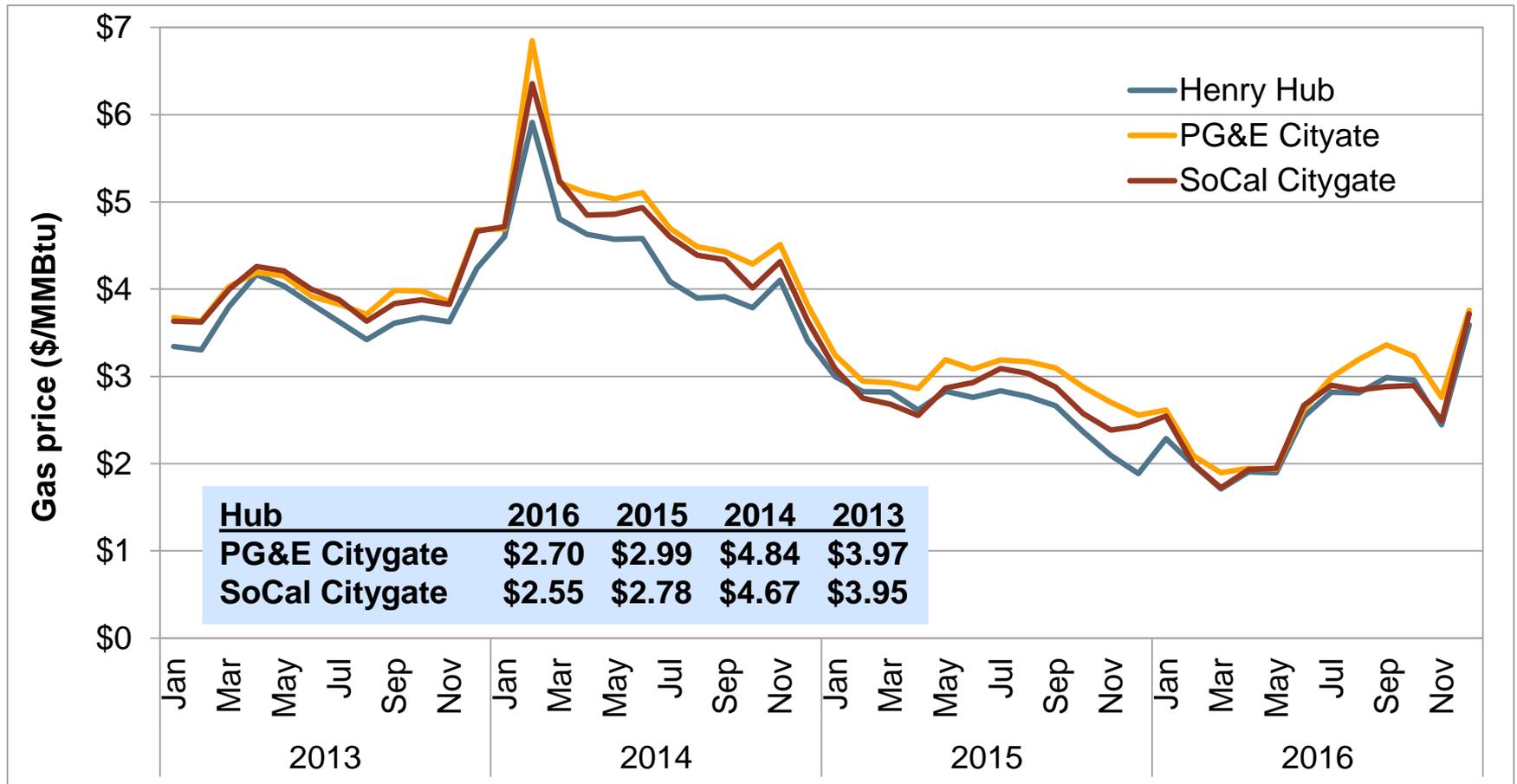
Solar generation increased by about 30 percent and continues to be the largest source of renewable generation connected to the ISO.



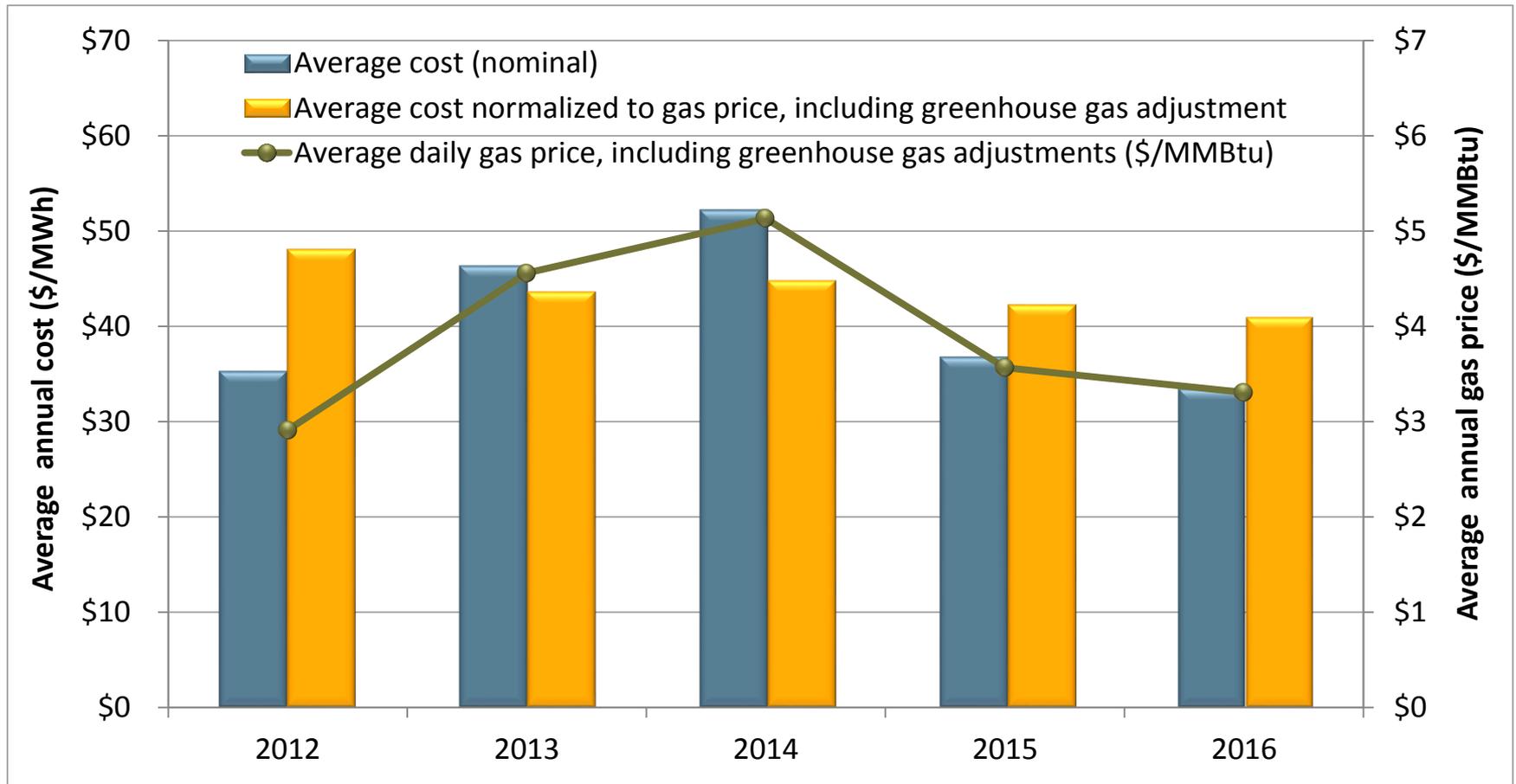
Solar capacity made up more than 80 percent of total new summer capacity in 2016.



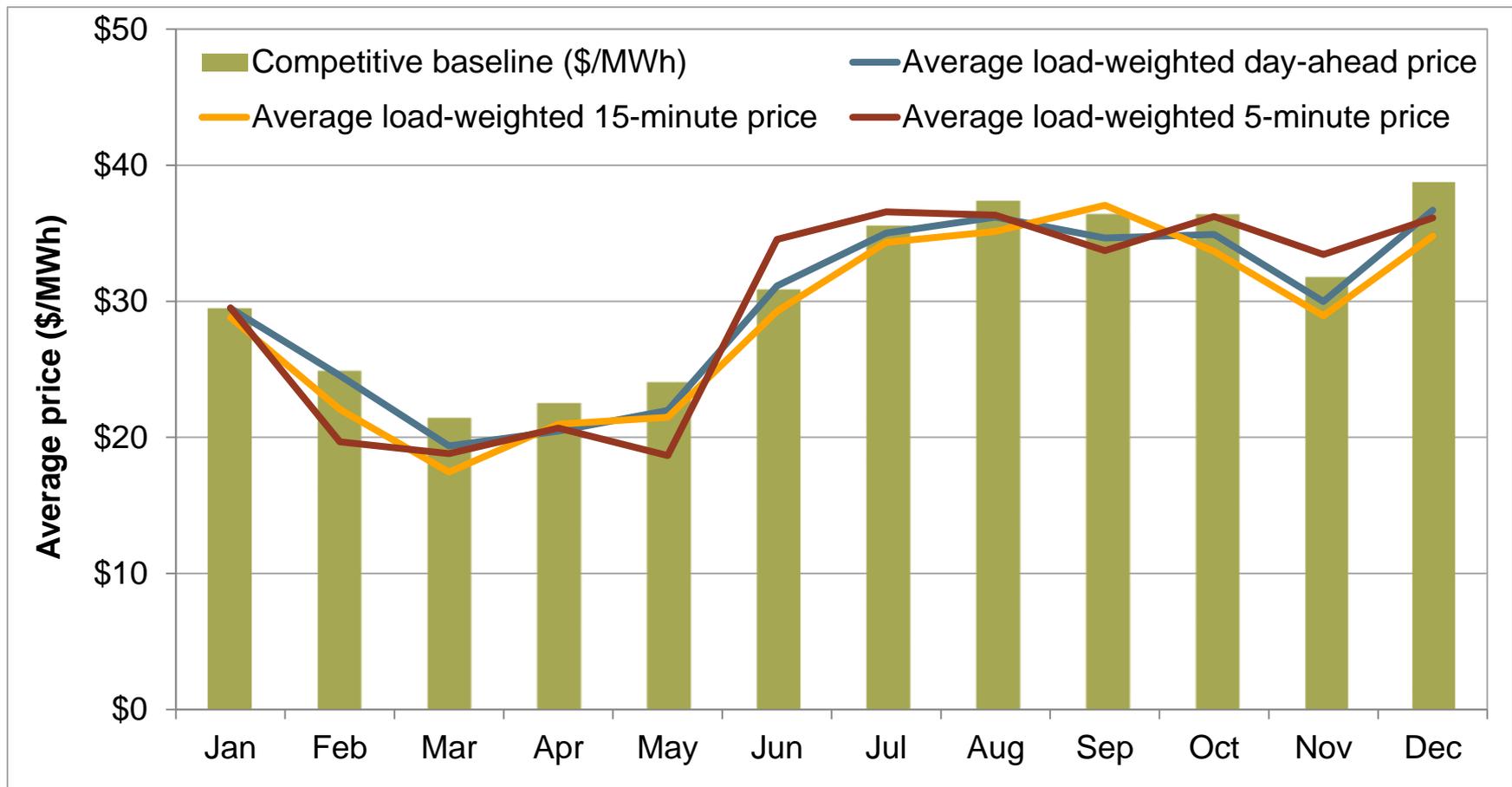
# Natural gas prices decreased by about 9 percent in 2016.



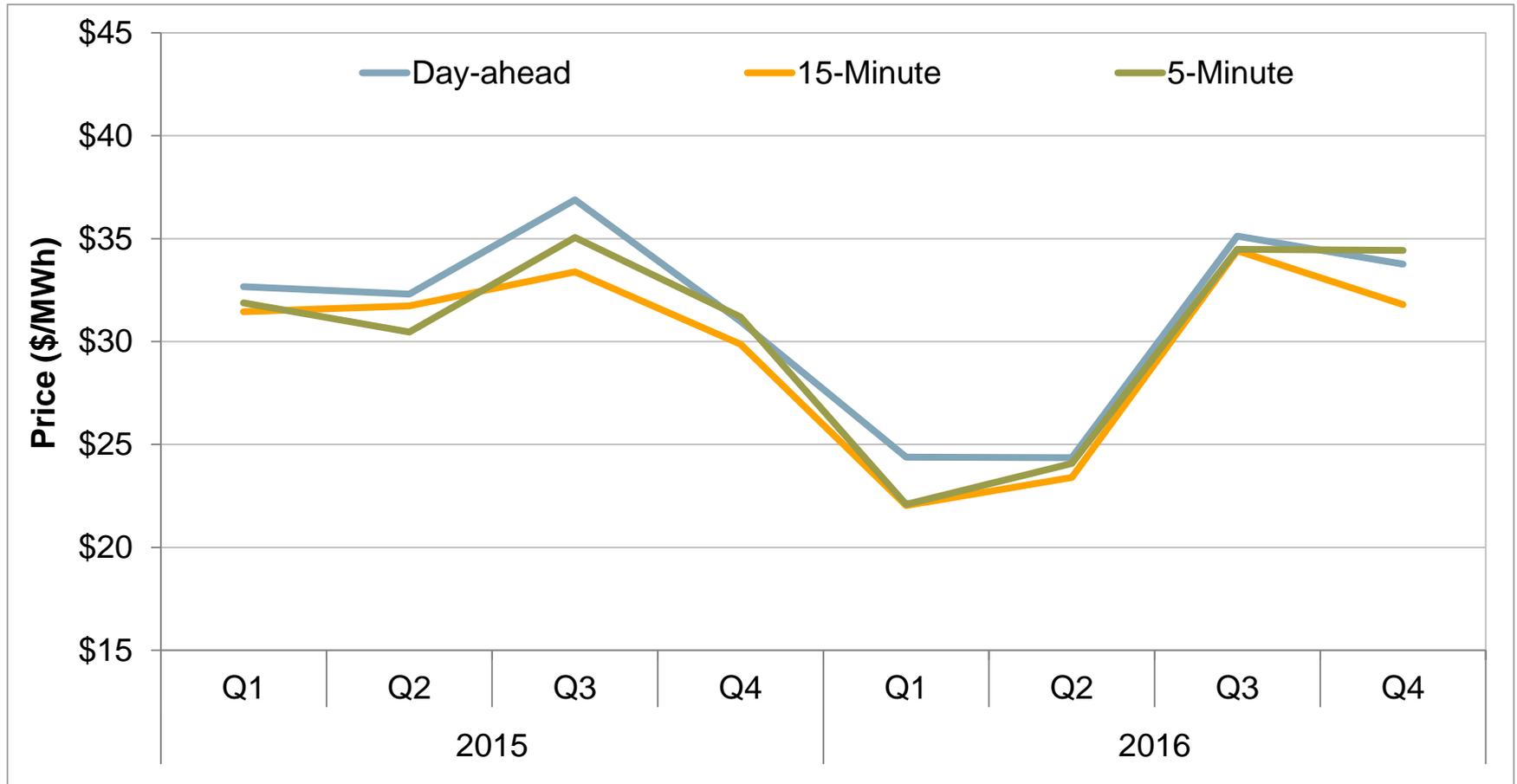
Total market costs were down by about 4 percent after accounting for natural gas and greenhouse gas price changes.



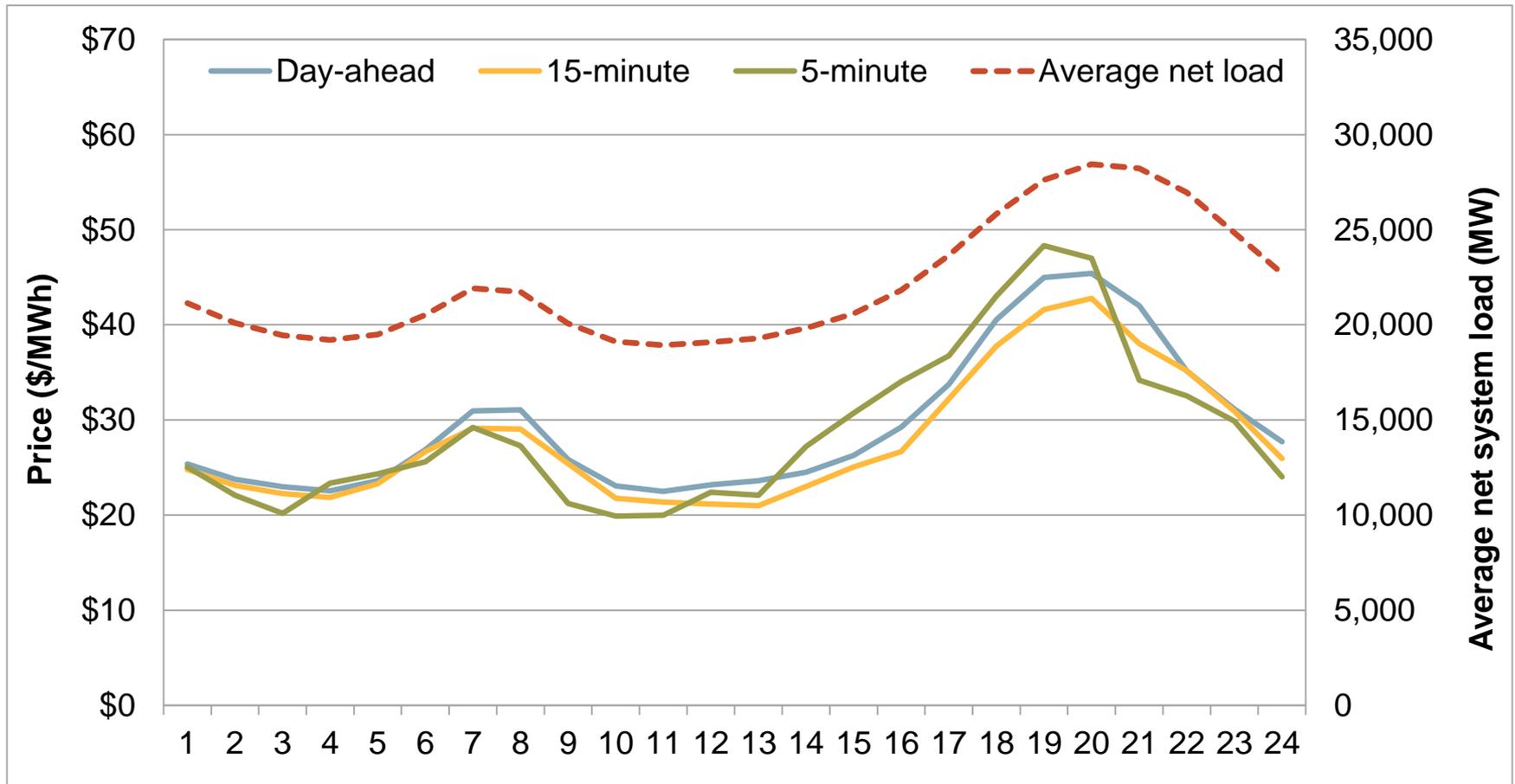
# Markets continued to perform close to competitive benchmarks.



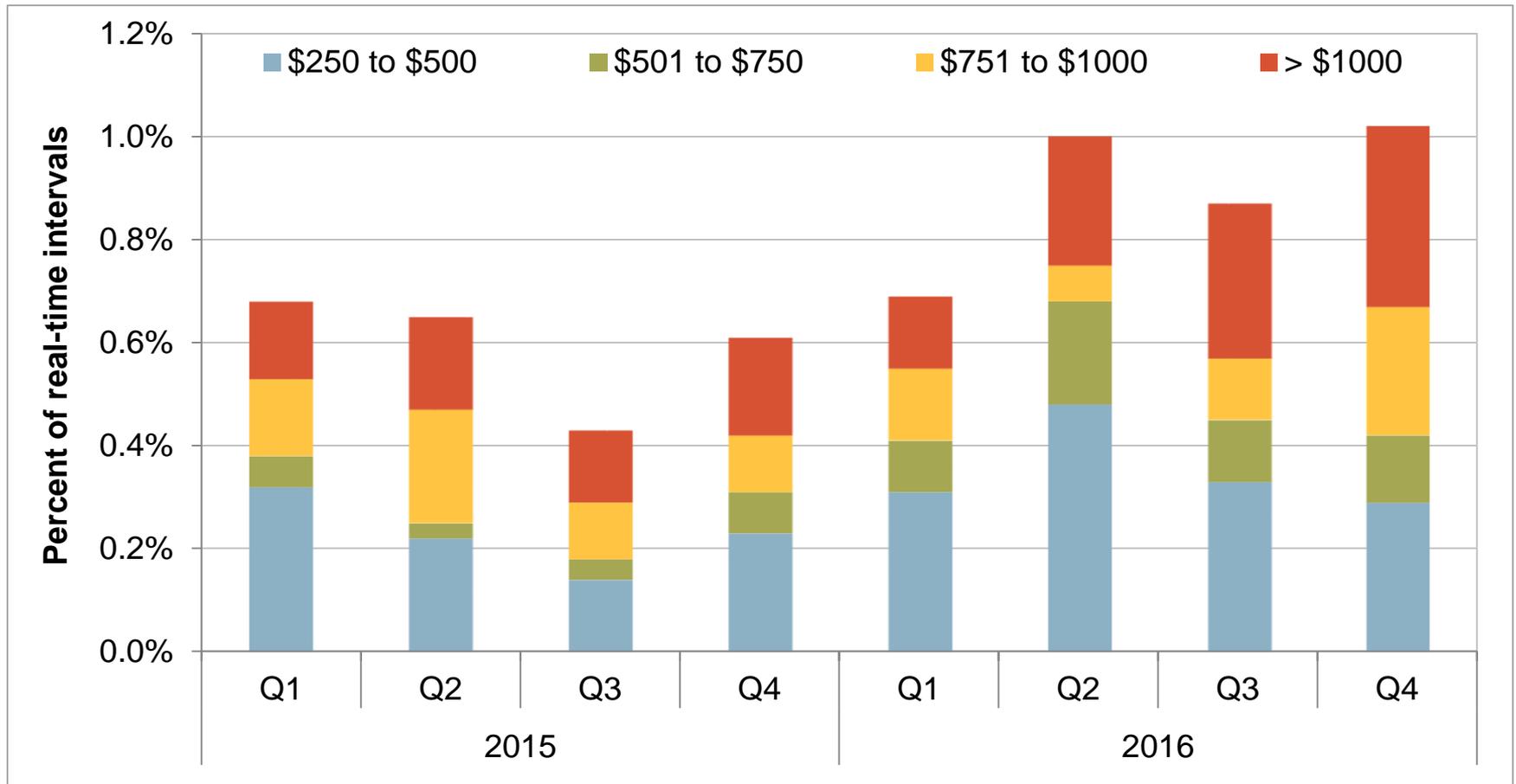
Day-ahead prices continued to be higher than real-time prices for much of the year.



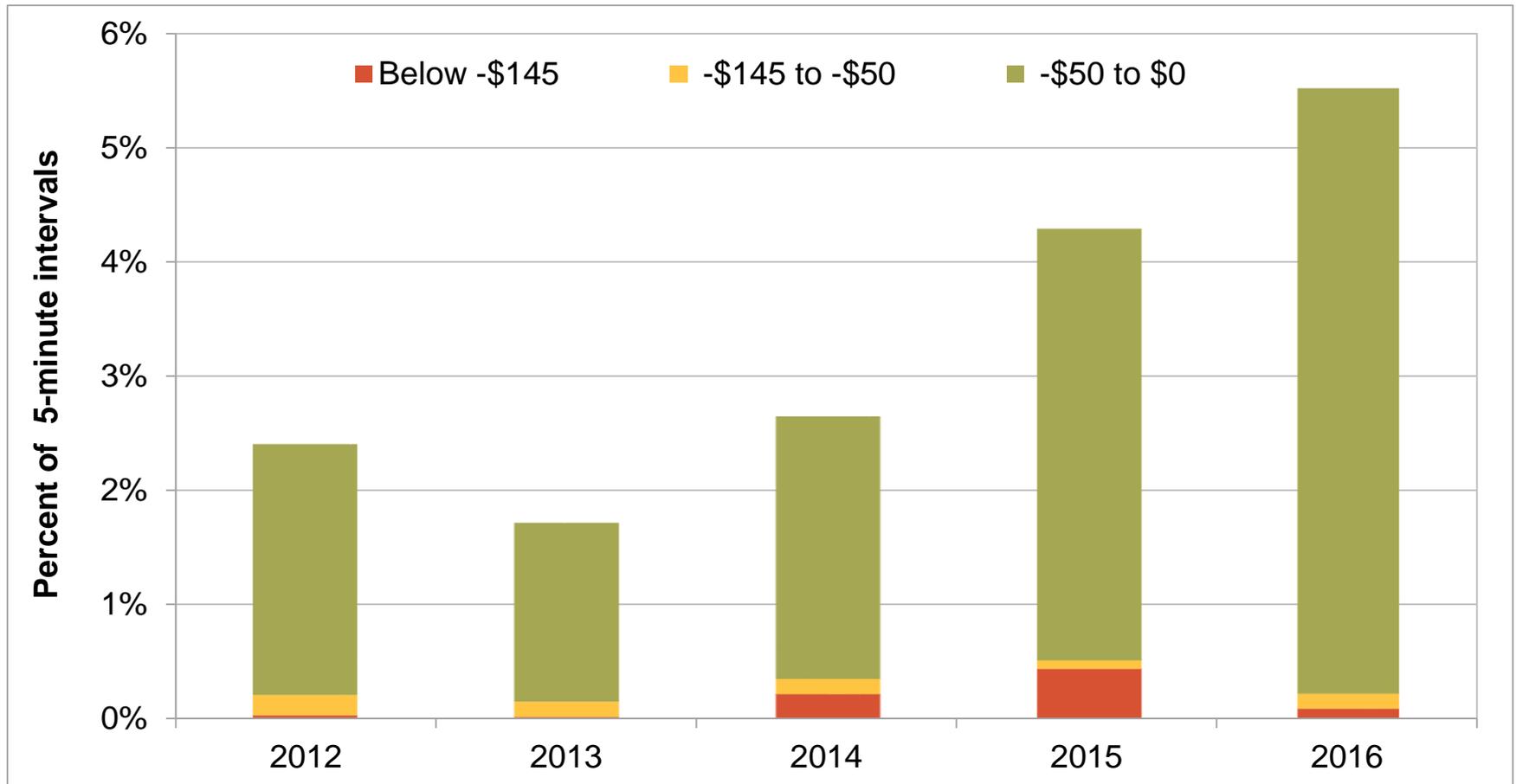
Prices followed the net load curve and were higher in the 5-minute market than in the day-ahead market during ramping hours.



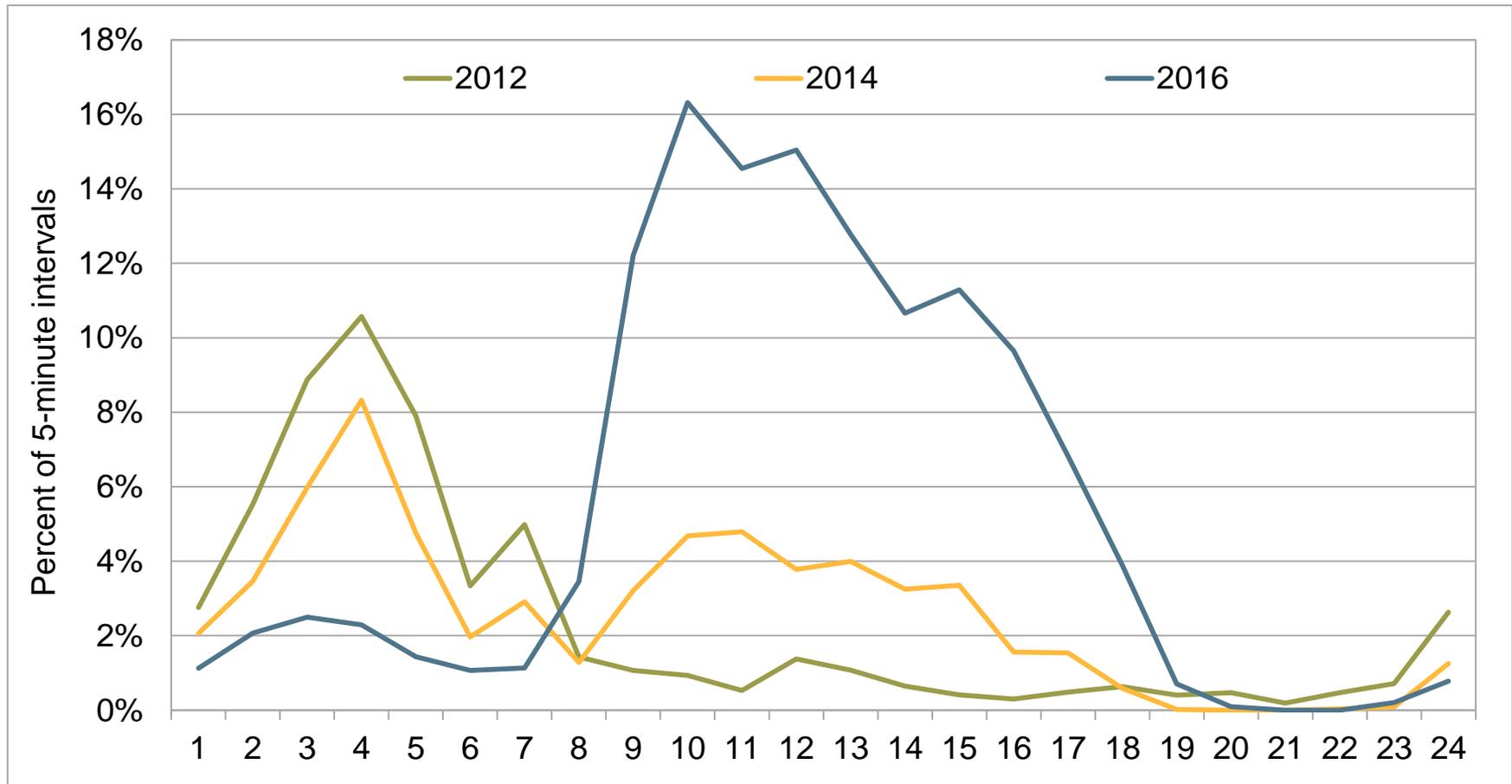
# Price spikes in the 5-minute market continued to be relatively infrequent in 2016.



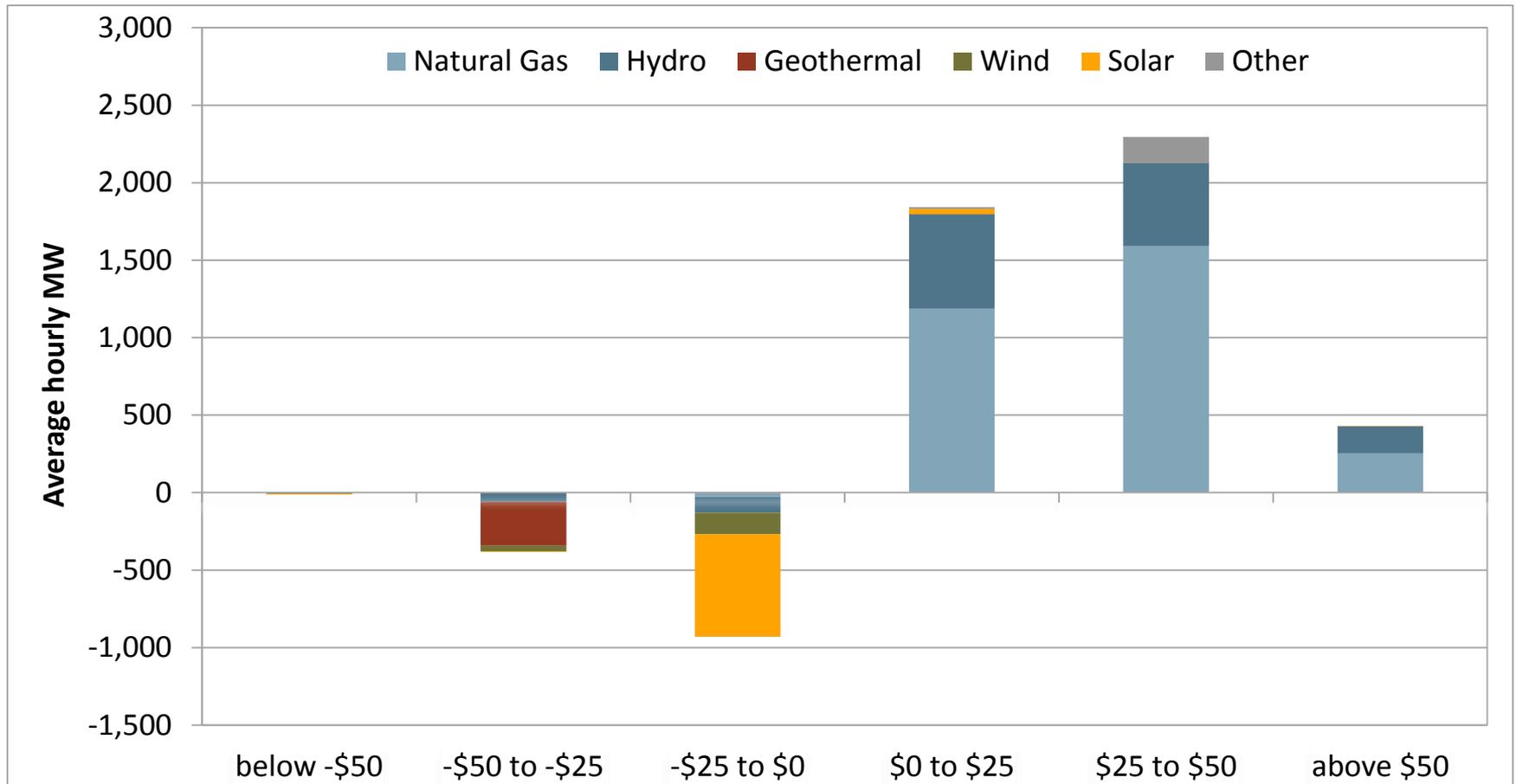
The frequency of negative prices continued to grow in 2016 and were most frequent in the second quarter.



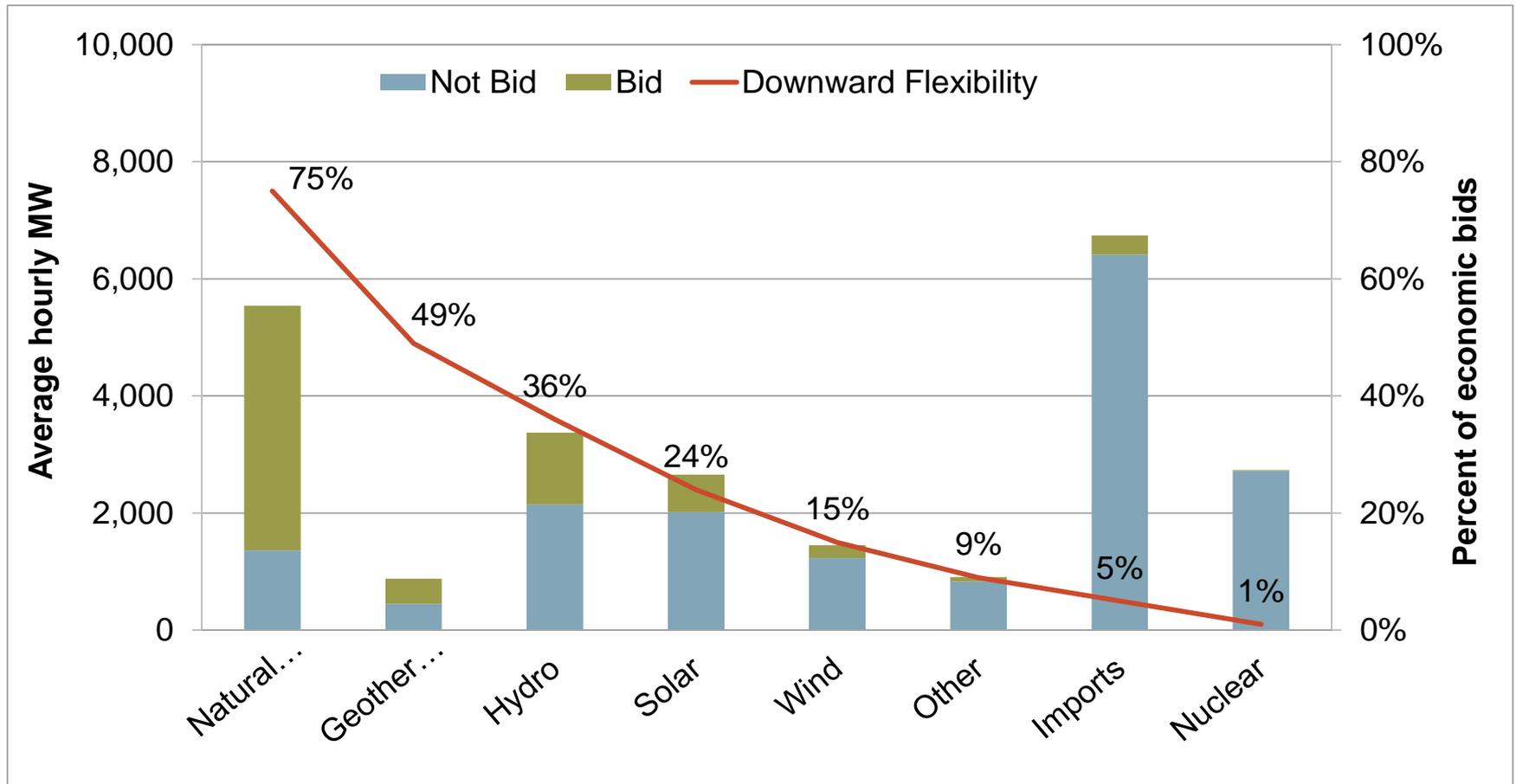
The profile of when negative prices occur has changed with the net load curve.



# Renewable resources primarily bid into the real-time market at negative prices in 2016.



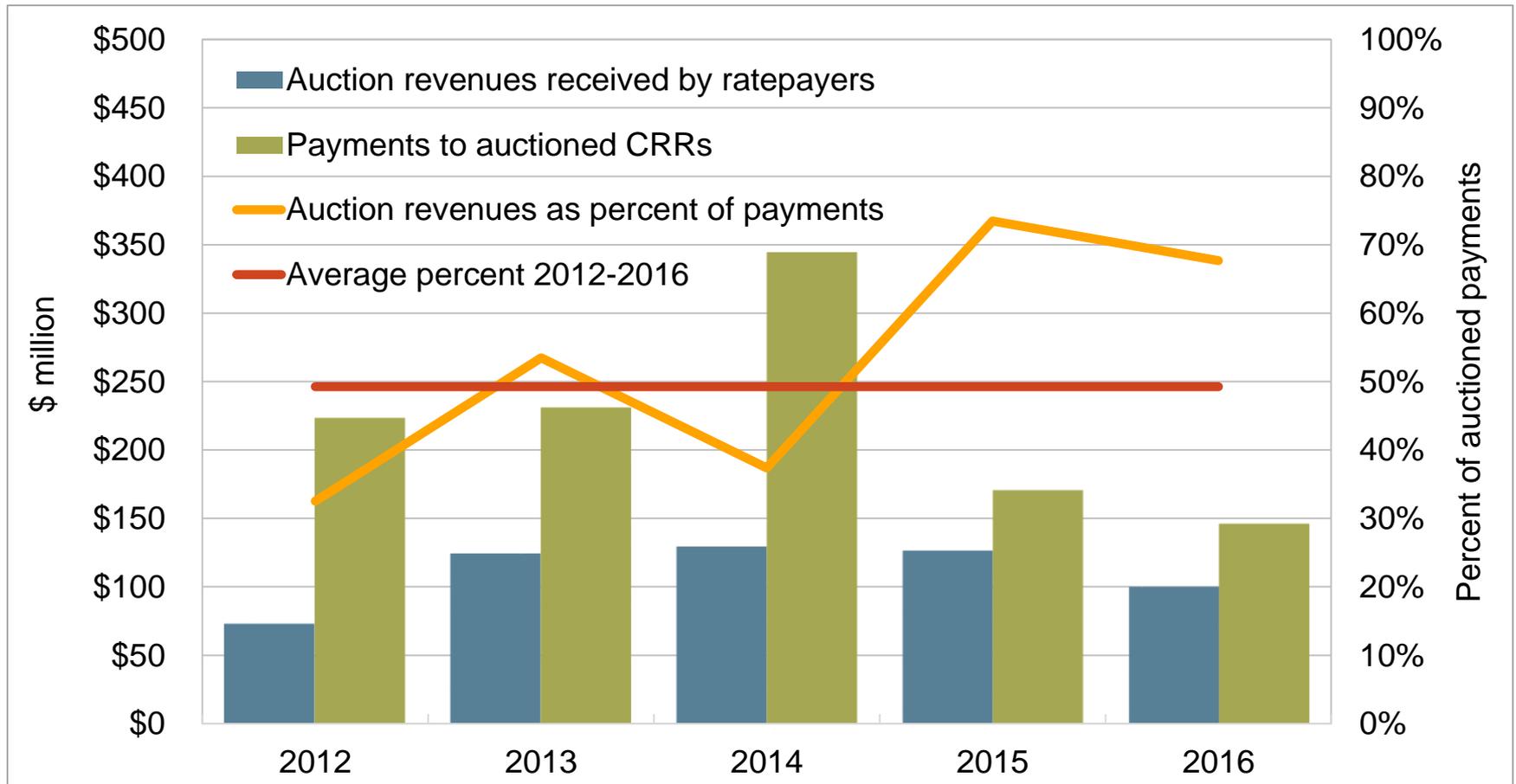
# Most natural gas resources provided economic bids in the real-time market.



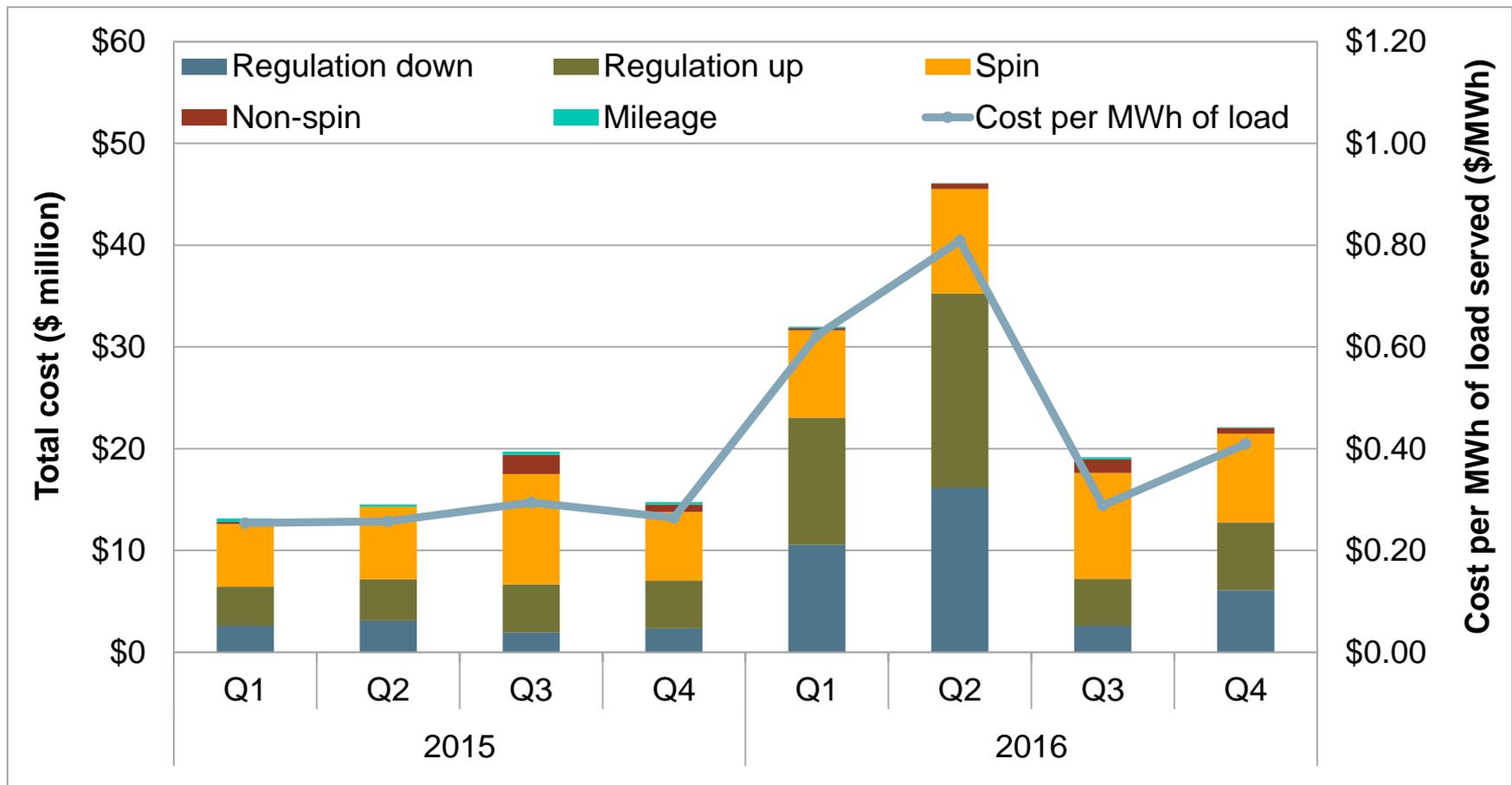
Revenues for a hypothetical combustion turbine were significantly below \$177/kW-yr fixed cost estimates.

- DMM updated assumptions in our net-revenue analysis
- Analysis showed that a hypothetical combustion turbine would have earned net revenues between \$5/kW-year and \$17/kW-year
  - The CEC estimates fixed costs at \$177/kW-year
- A combined cycle plant would have earned revenues between \$11/KW-year and \$22/kW-year
  - The CEC estimates fixed costs at \$166/kW-year

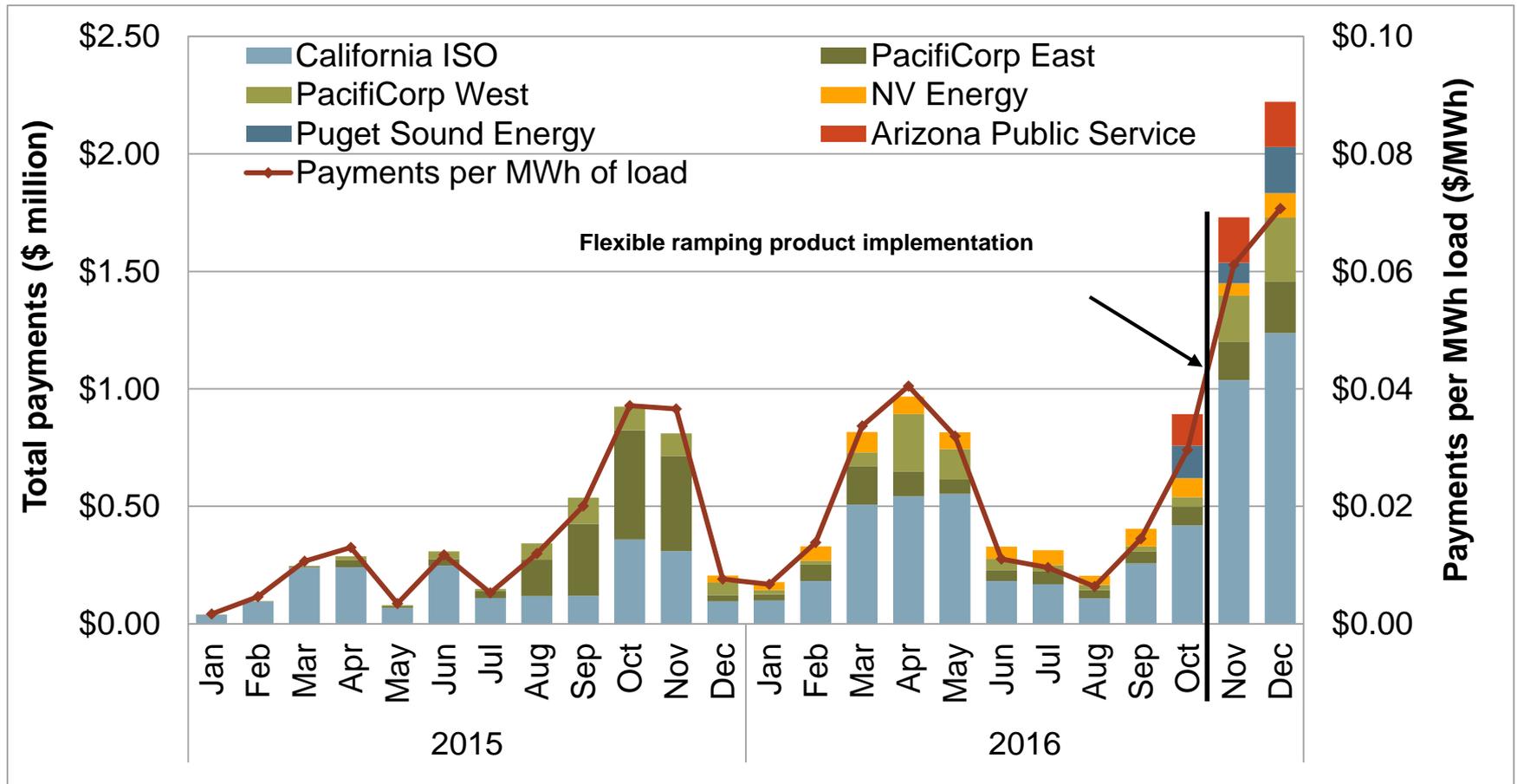
Historically, ratepayers have received less than half of the value of auctioned off congestion revenue rights. This trend continued in 2016.



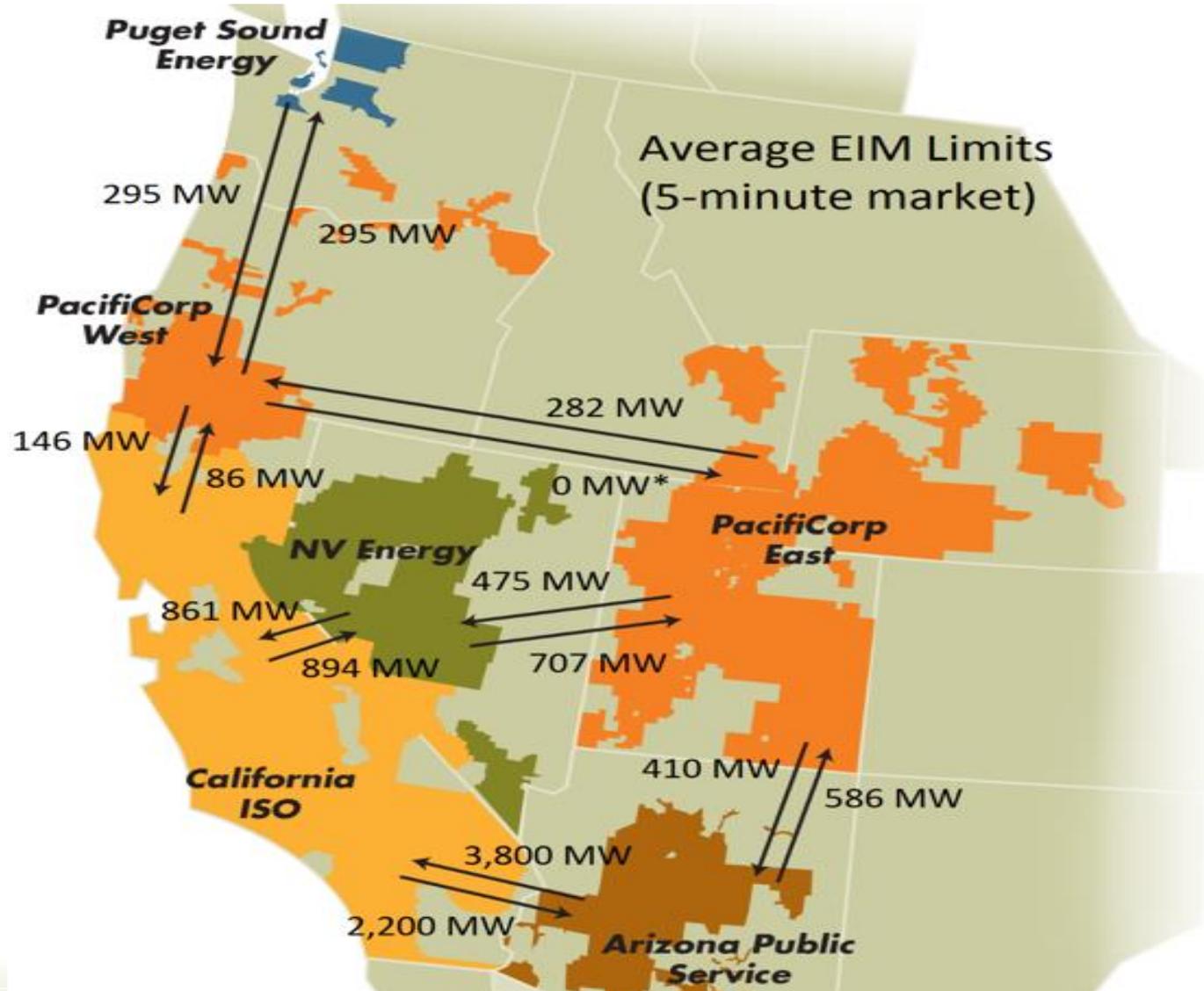
# Regulation requirements and costs increased in 2016 to address variable renewable output.



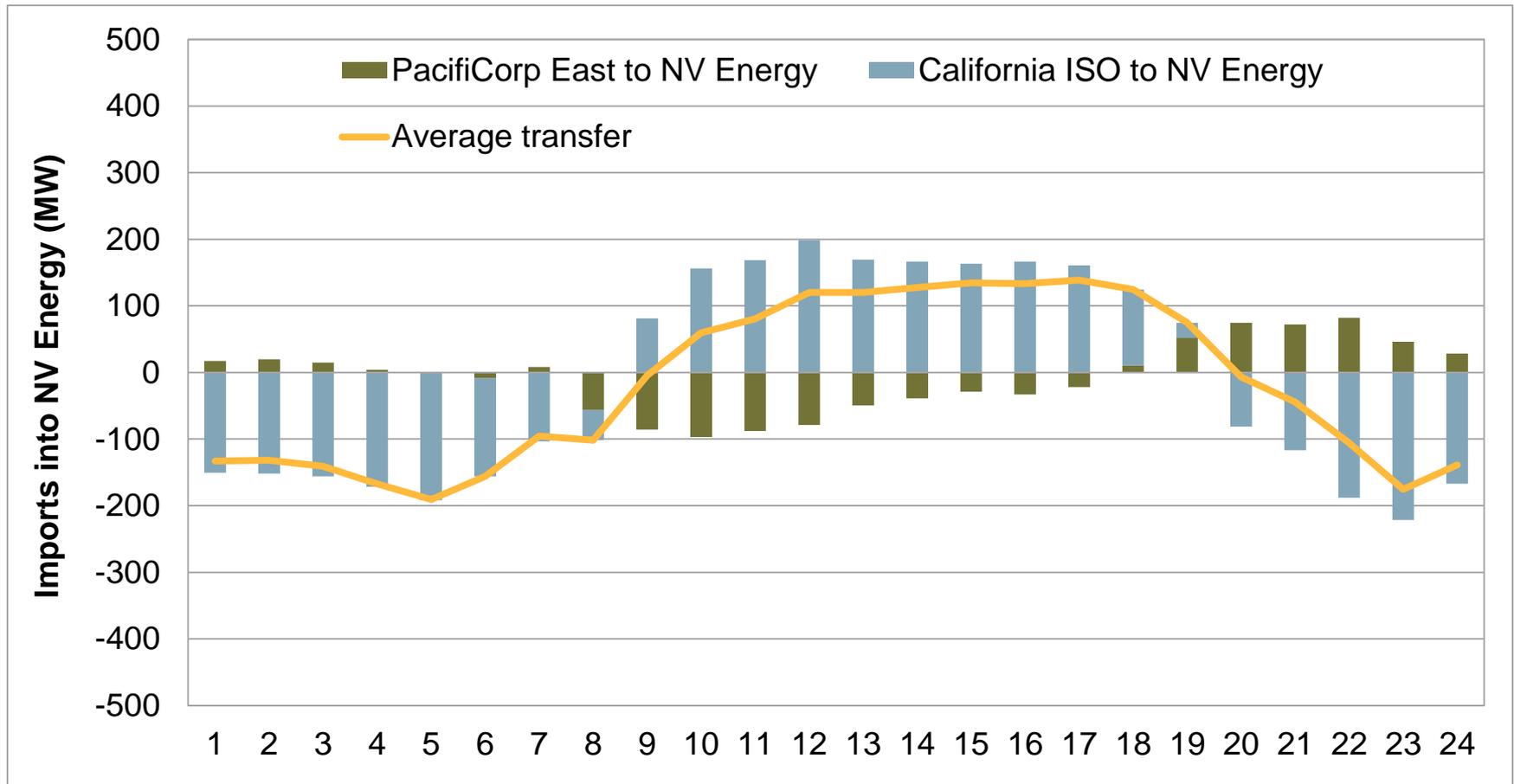
# The flexible ramping product replaced the flexible ramping capacity mechanism in November.



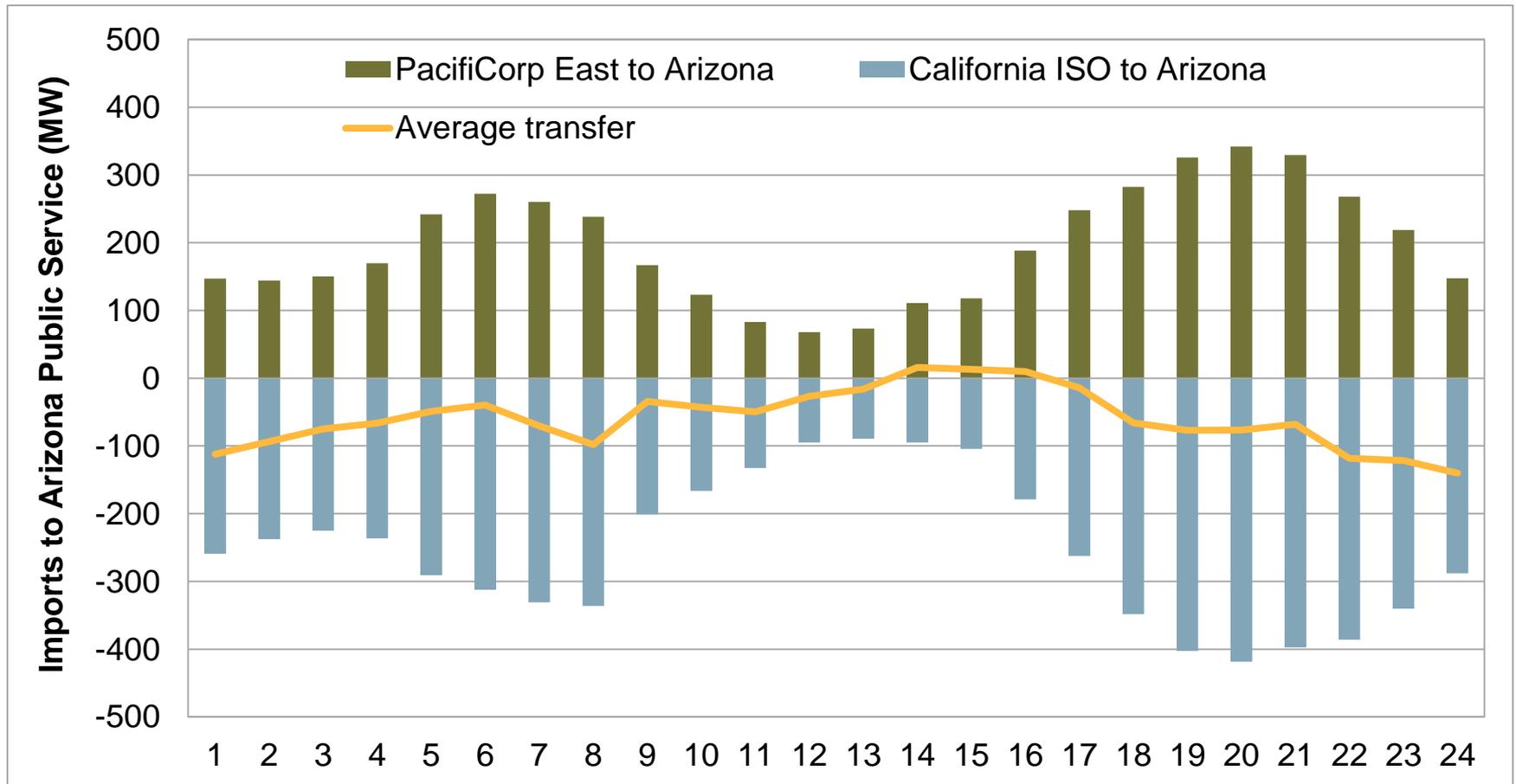
# Average limits in the energy imbalance market



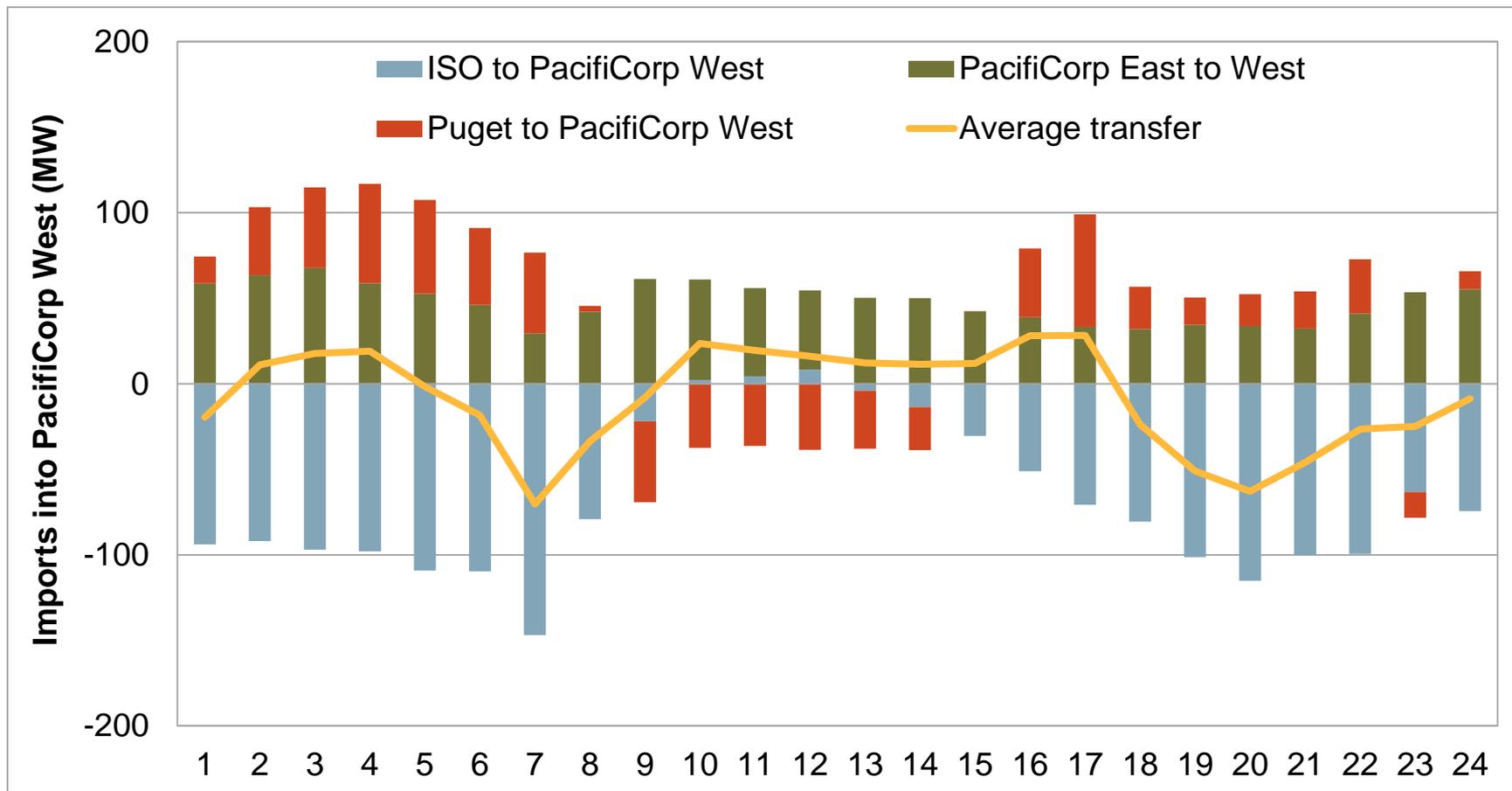
# Transfers tended to flow into NV energy from the ISO in the midday hours.



# Arizona transferred energy in from PacifiCorp East and out to the ISO.



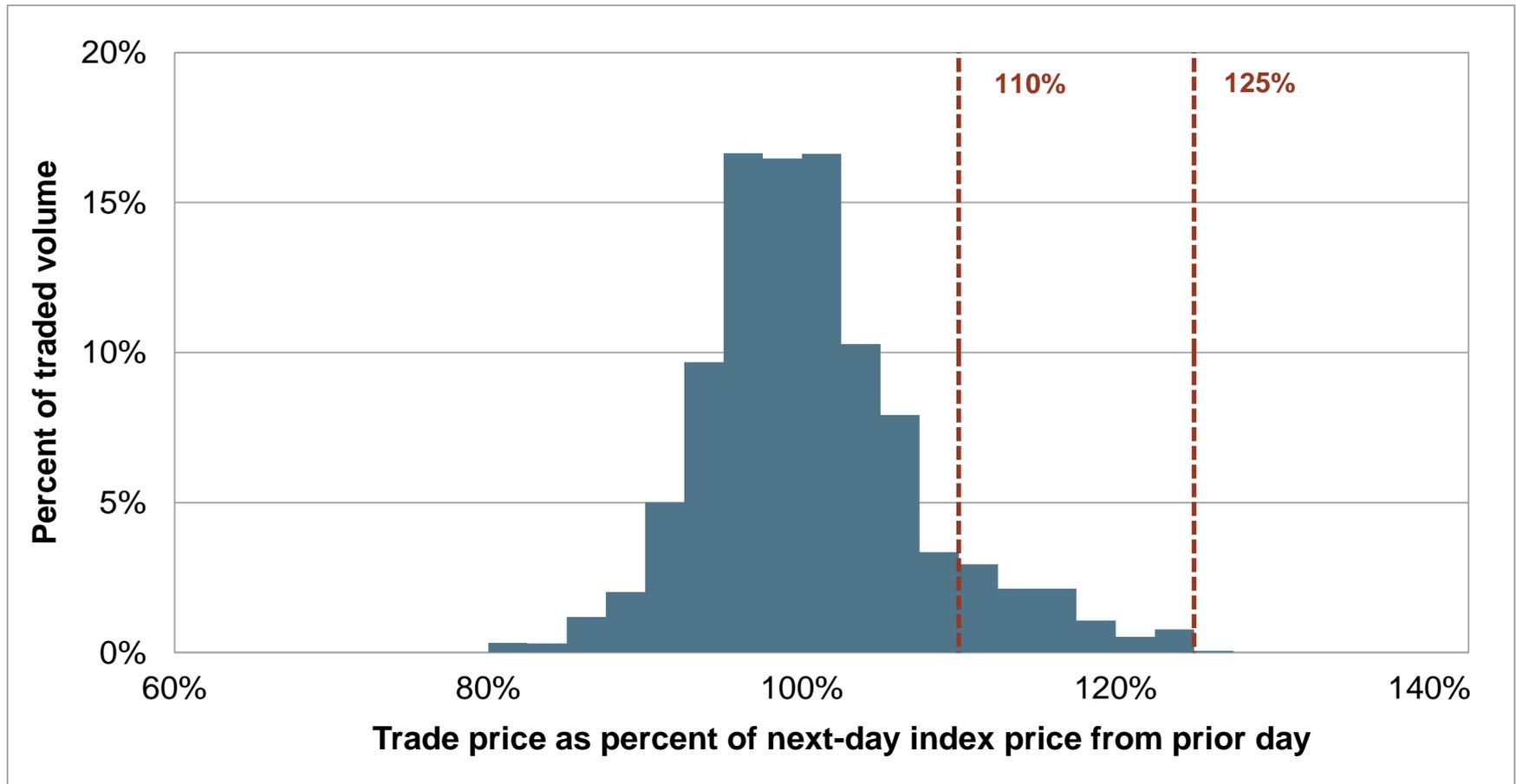
# PacifiCorp West sent transfer energy to Puget during midday hours.



# Key recommendations

- Congestion revenue rights
- Gas prices used for bid caps
- Opportunity cost adders
- Bidding limits for EIM participants

# Impact of 1-day lag in next day gas prices used in day-ahead market.



Next-day trade prices available at 8:30 am tend to be very close to next-day average prices.

