

Operating Reserves Educational Session Part B

Energy Market Uplift
Senior Task Force
September 17, 2013

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Monitoring Analytics

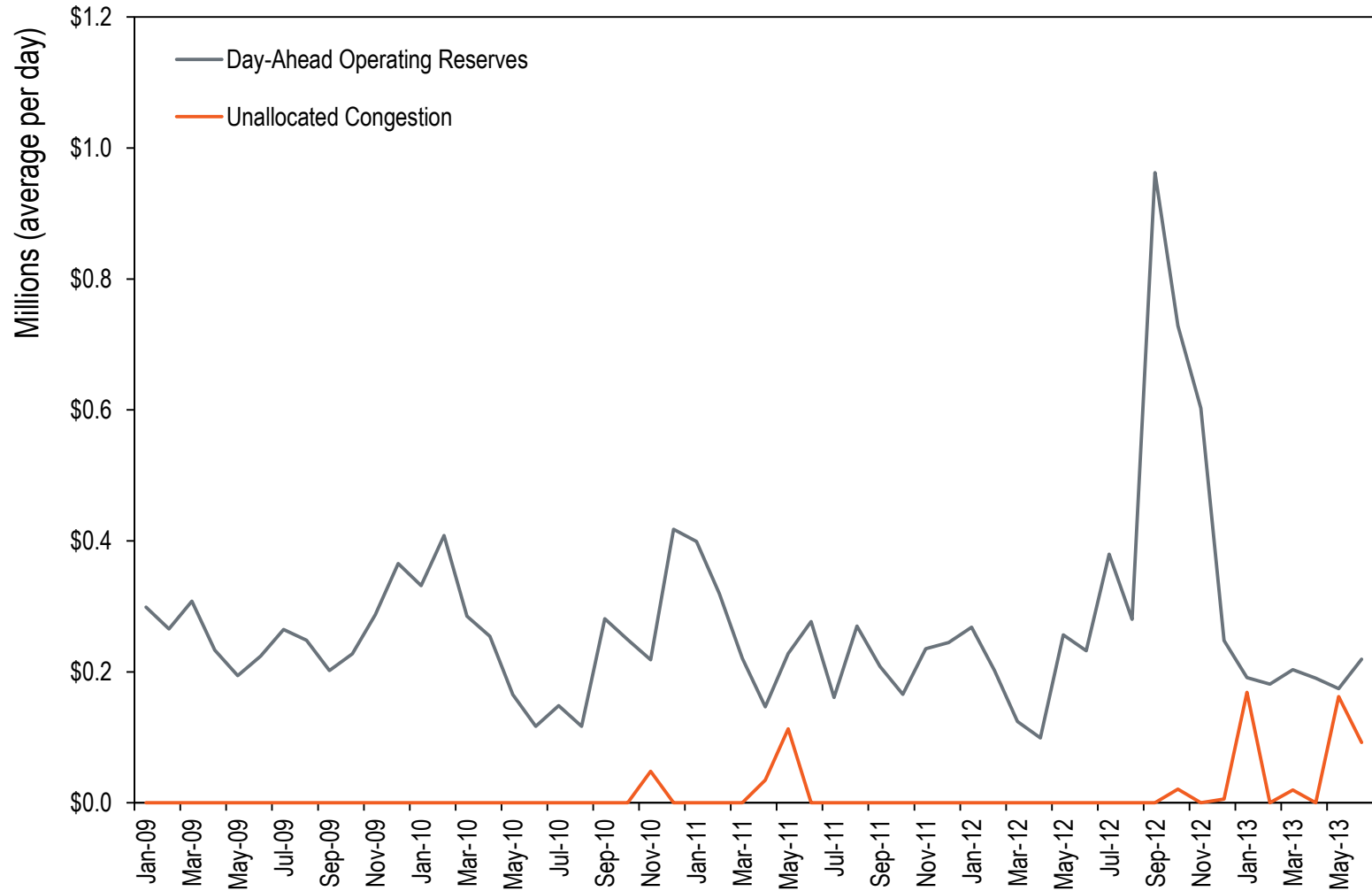
Operating Reserves

Operating reserves can be grouped into five categories:

- **Day-Ahead**
- **Balancing**
- **Reactive Services**
- **Black Start Services**
- **Synchronous Condensing**



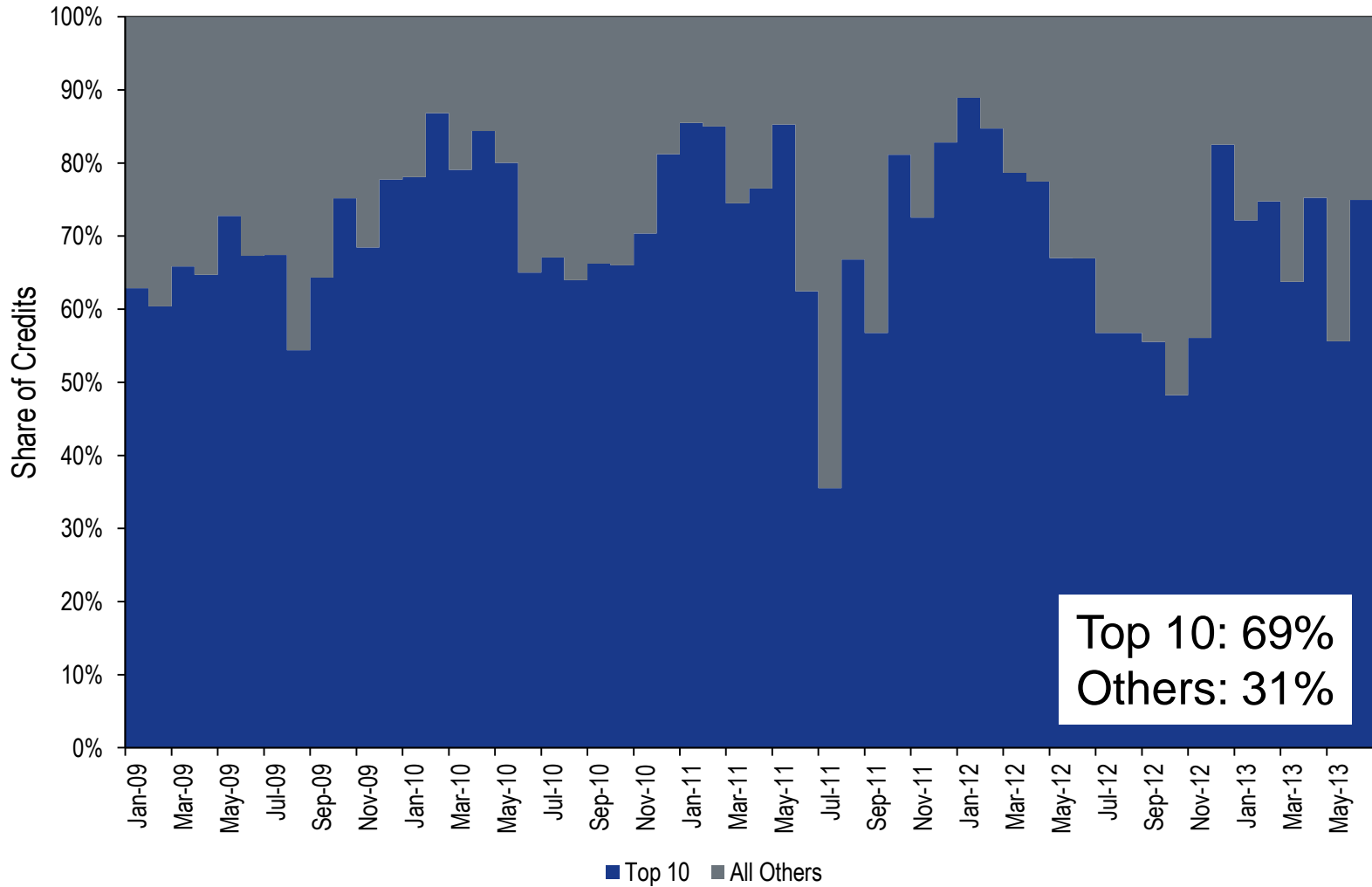
Day-Ahead Charges



Day-Ahead Charges

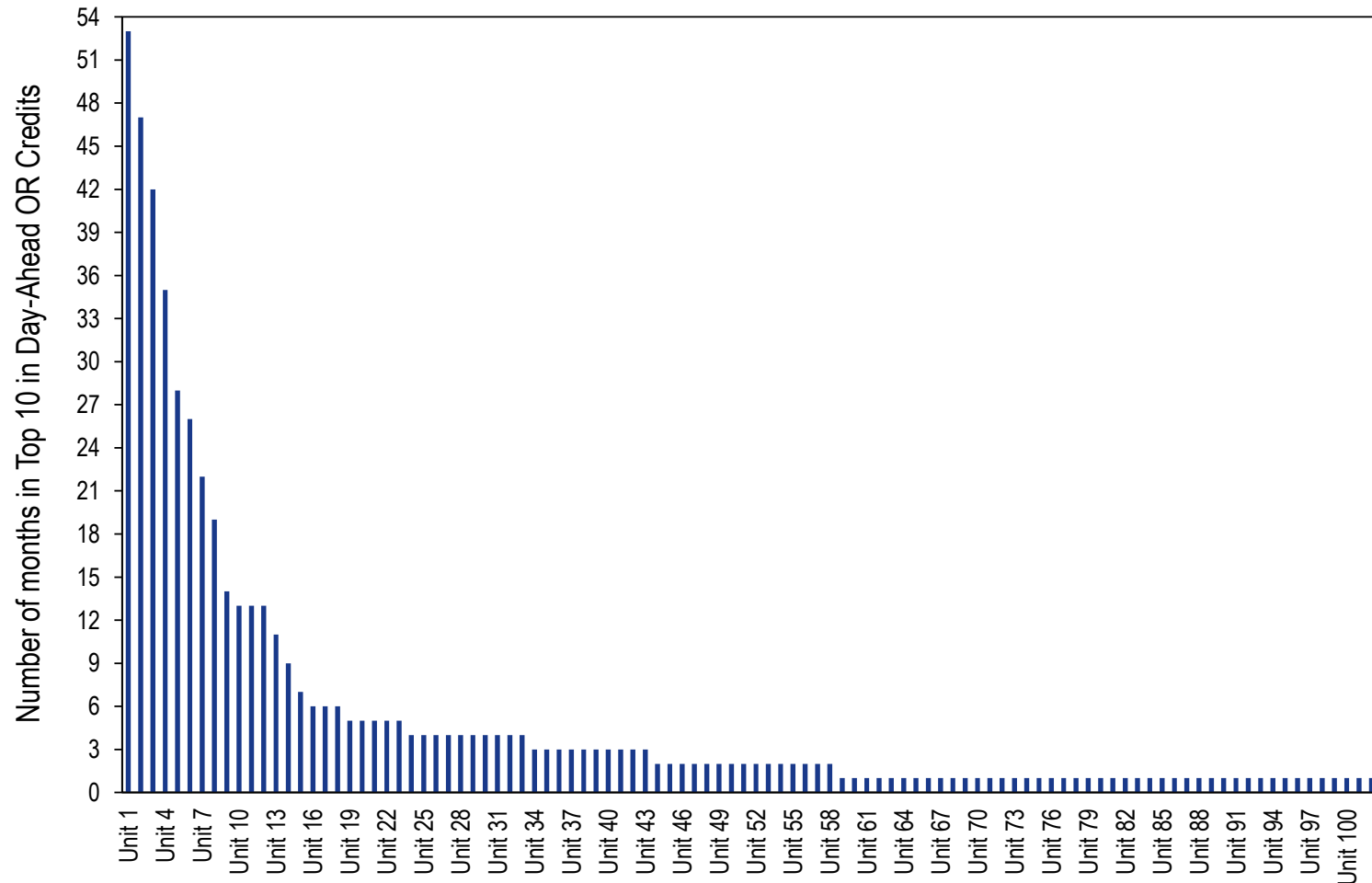
- **Total Day-Ahead Operating Reserve Charges from Jan 2009 – Jun 2013:**
 - **\$462 million**
- **From Day-Ahead Operating Reserve Credits (Not Black Start or Reactive):**
 - **\$442 million (96% of all DA OR Charges)**
- **From Unallocated Congestion:**
 - **\$20 million (4% of all DA OR Charges)**
 - **67% or \$14 million since Jan 2013.**

Day-Ahead Credits Concentration



Top 10: 69%
Others: 31%

Day-Ahead Top 10 Units Distribution



Top 10 Distribution: 102 units.

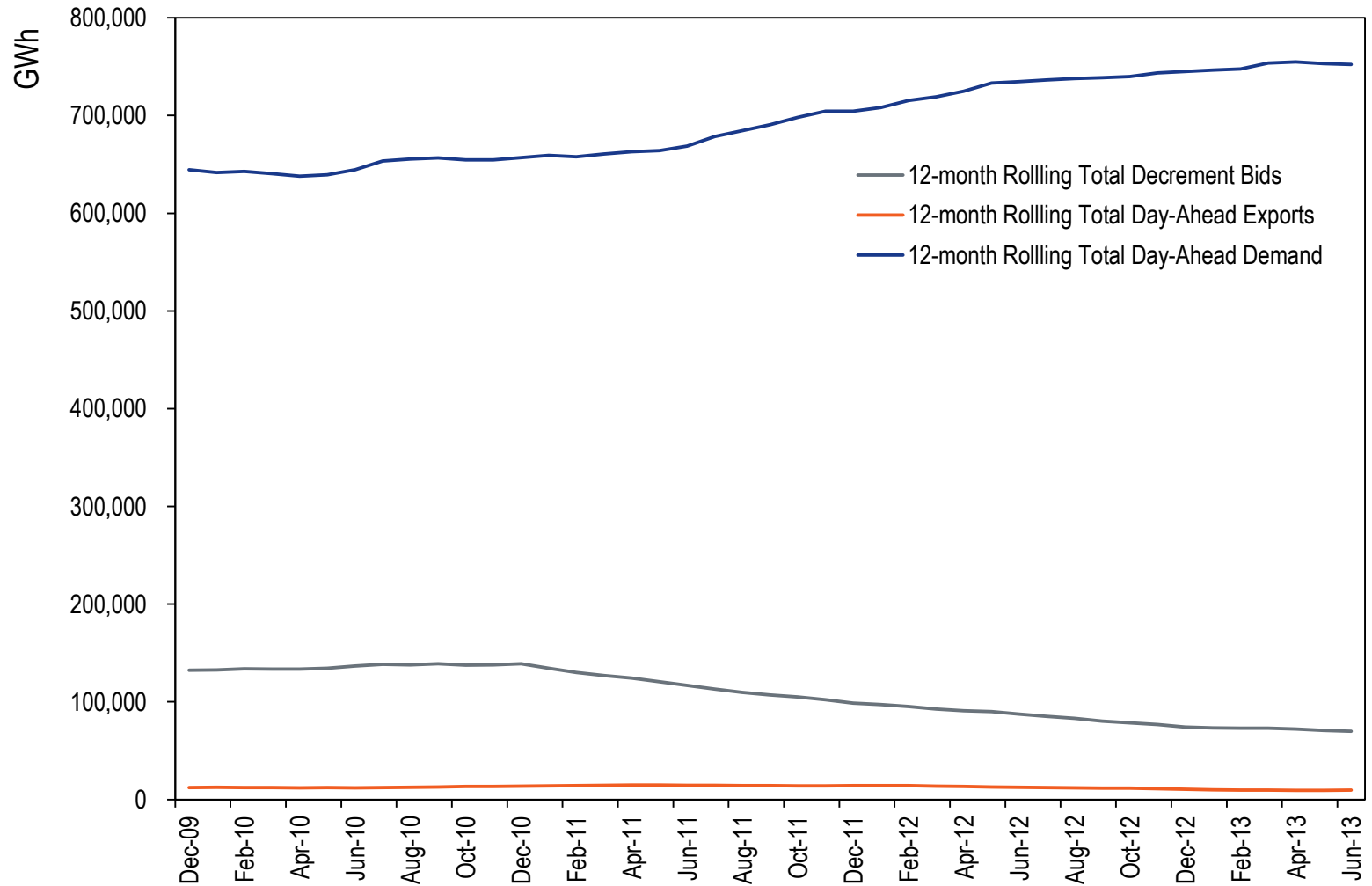
Unit 1 was in top 10 in 53 months out of 54 months.

Day-Ahead Allocation Recap

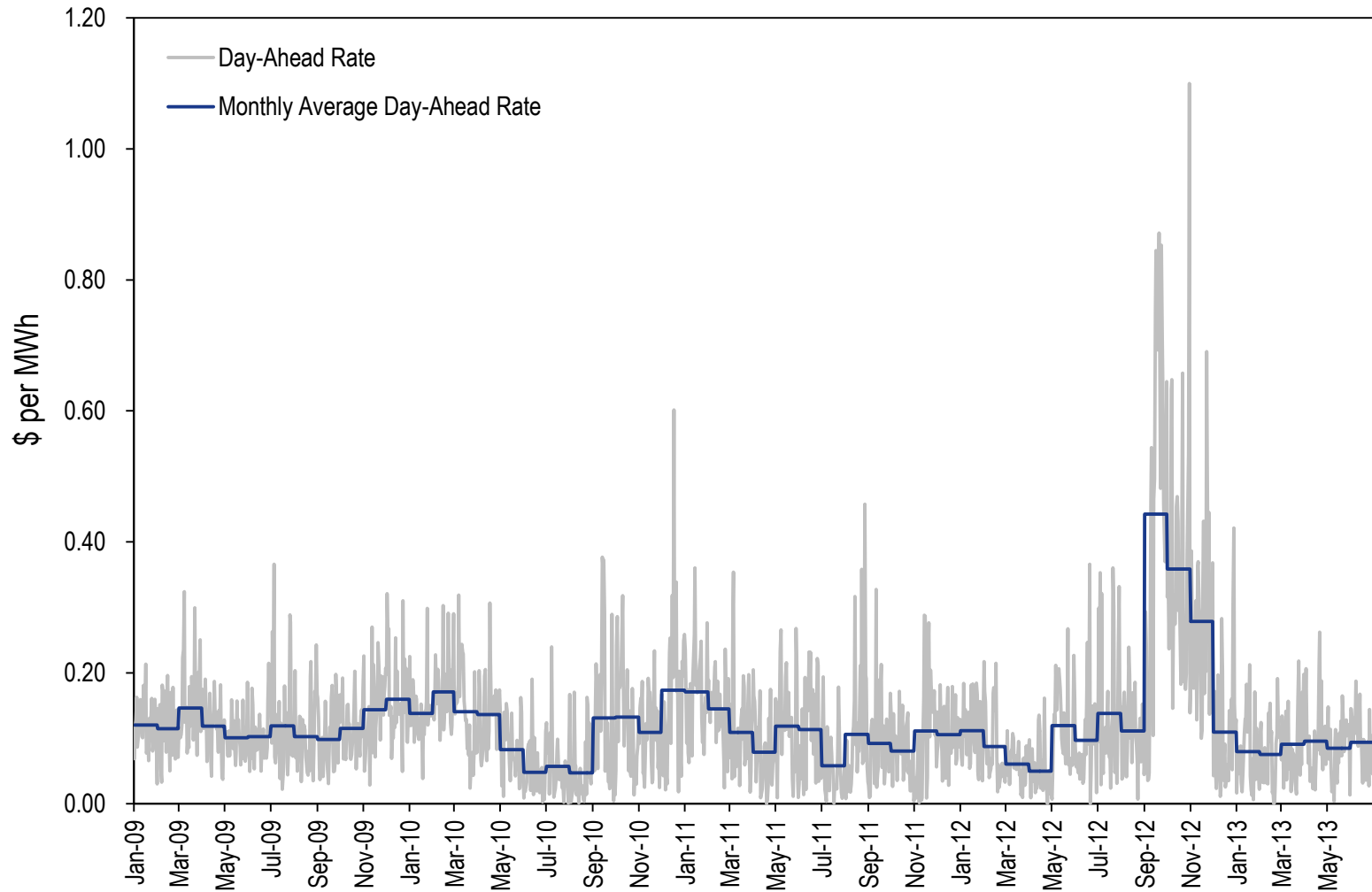
- **Charges are paid by:**
 - **Day-Ahead Demand Bids (Load)**
 - **Day-Ahead Exports**
 - **Day-Ahead Decrement Bids (DECs)**
- **Charges are allocated across the entire RTO. Each transaction pays the same rate per day across the entire system.**



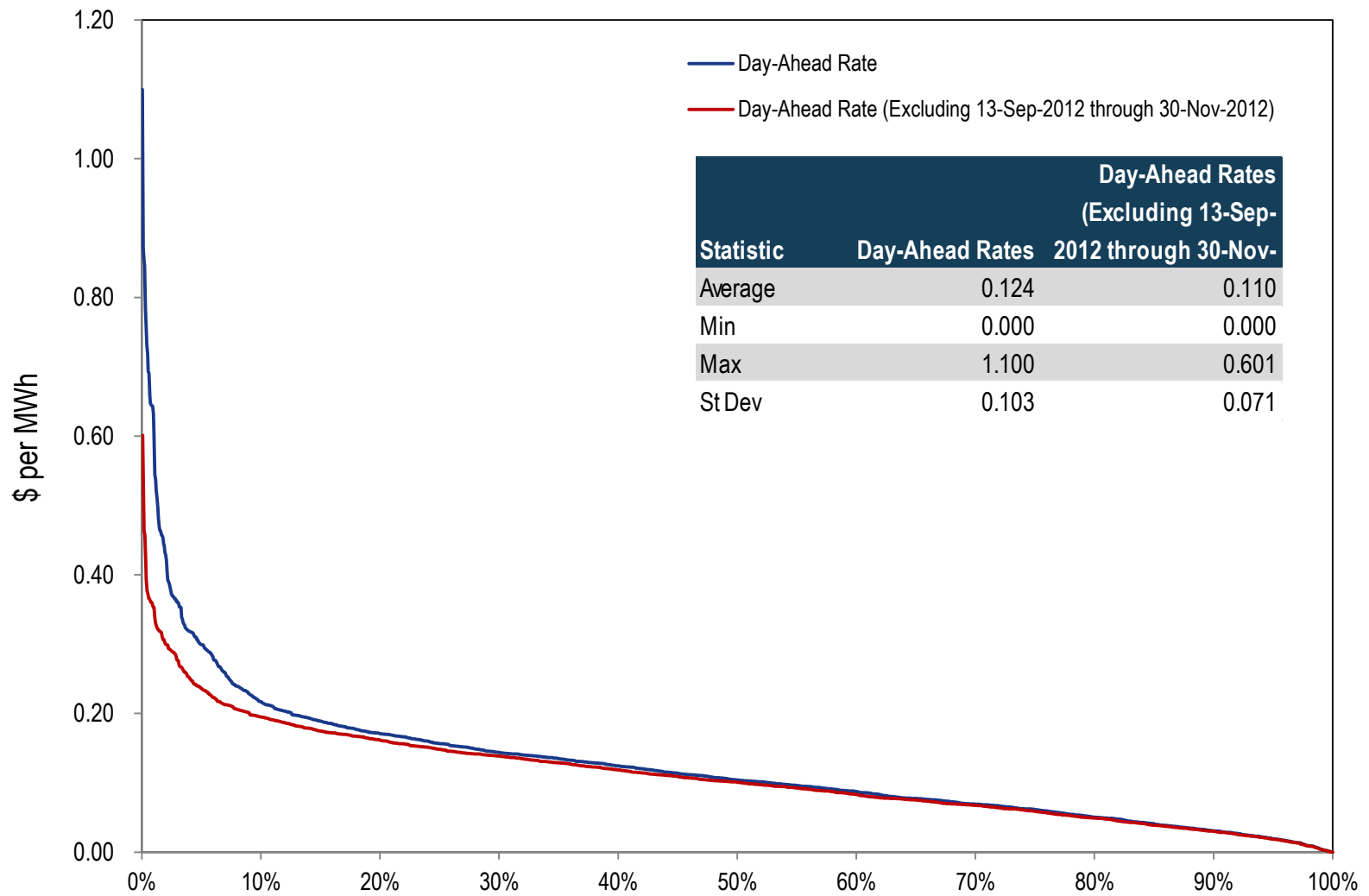
Basis for Day-Ahead Allocation



Day-Ahead Rate



Day-Ahead Rate



Operating Reserves

Operating reserves can be grouped into five categories:

- Day-Ahead
- **Balancing**
- Reactive Services
- Black Start Services
- Synchronous Condensing



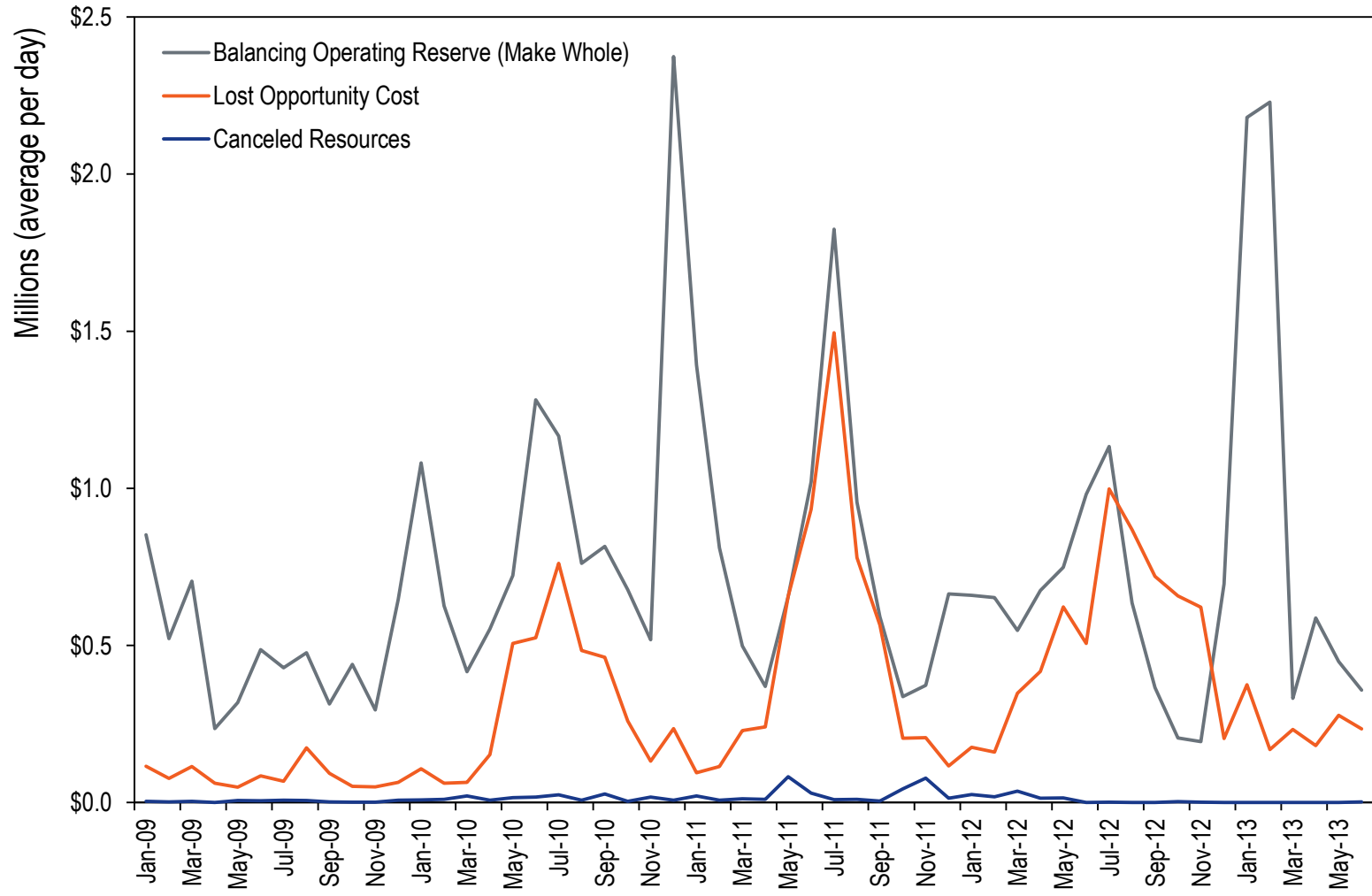
Balancing Charges

Balancing operating reserves:

- **Balancing (make whole)**
 - **Reliability**
 - RTO, East or West
 - **Deviations**
 - RTO, East or West
- **Lost Opportunity Cost (LOC)**
- **Canceled Resources**



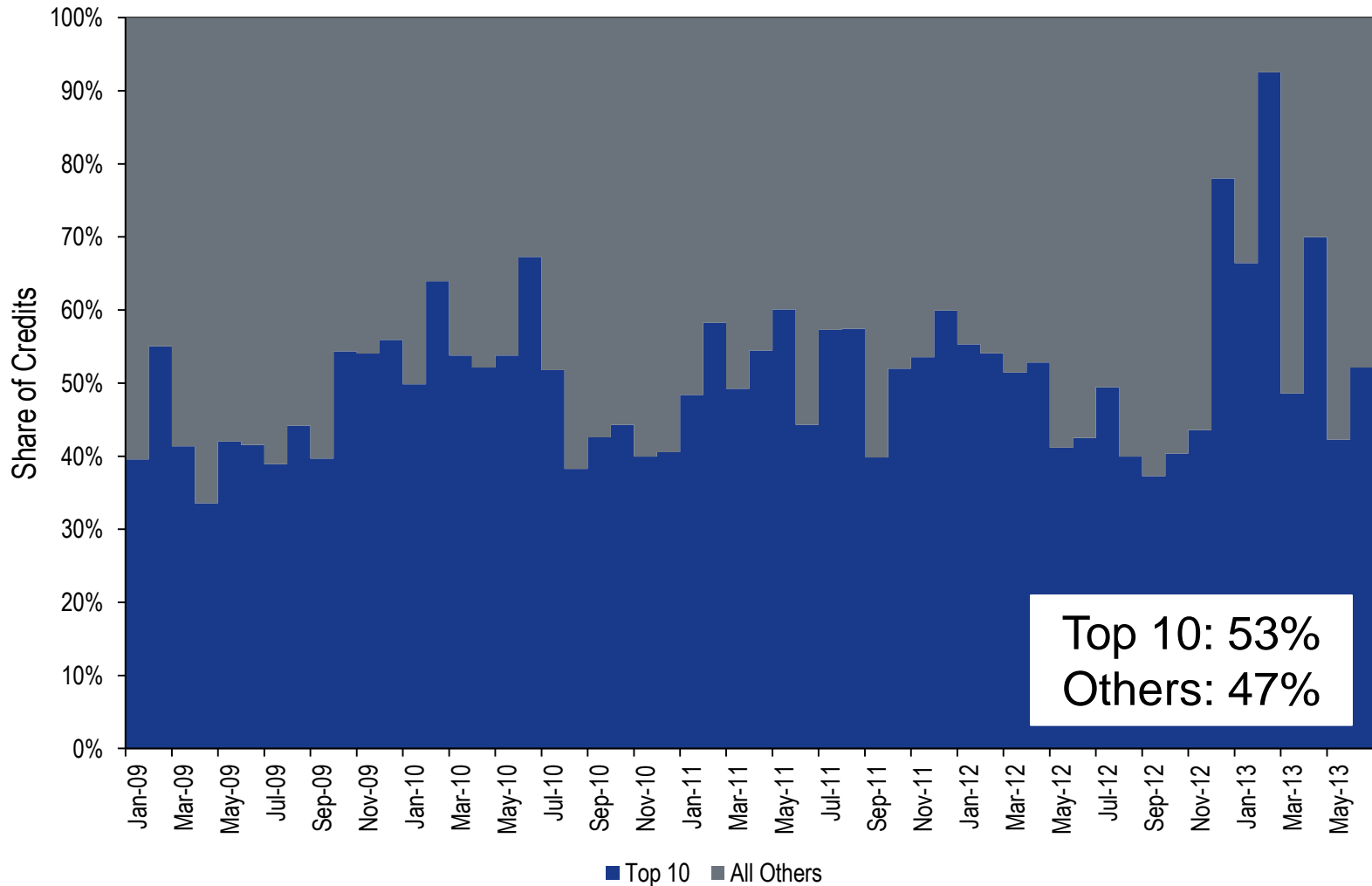
Balancing Charges



Balancing (BOR) Charges

- **Total BOR Charges from Jan 2009 – Jun 2013:**
 - **\$1,786 million**
- **From BOR Credits (make whole):**
 - **\$1,211 million (68% of all BOR Charges)**
- **From LOC:**
 - **\$555 million (31% of all BOR Charges)**
- **From Canceled Resources:**
 - **\$20 million (1% of all BOR Charges)**
 - **\$0.3 million after Jun-2012 (wind LOC Rule): Before wind LOC rule, LOC paid to wind units was categorized as canceled resources.**

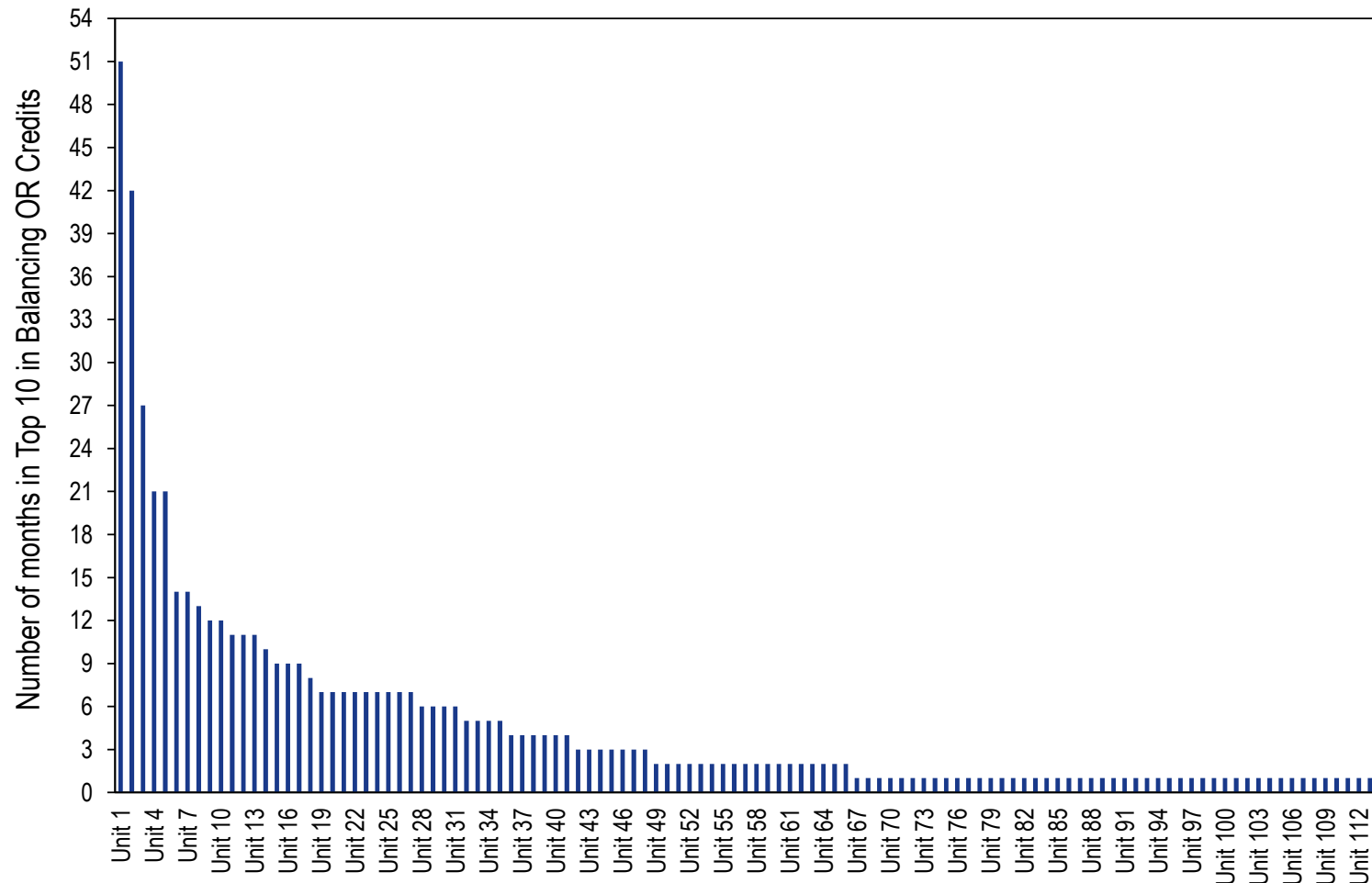
Balancing (Make Whole) Credits Concentration



Top 10: 53%
Others: 47%



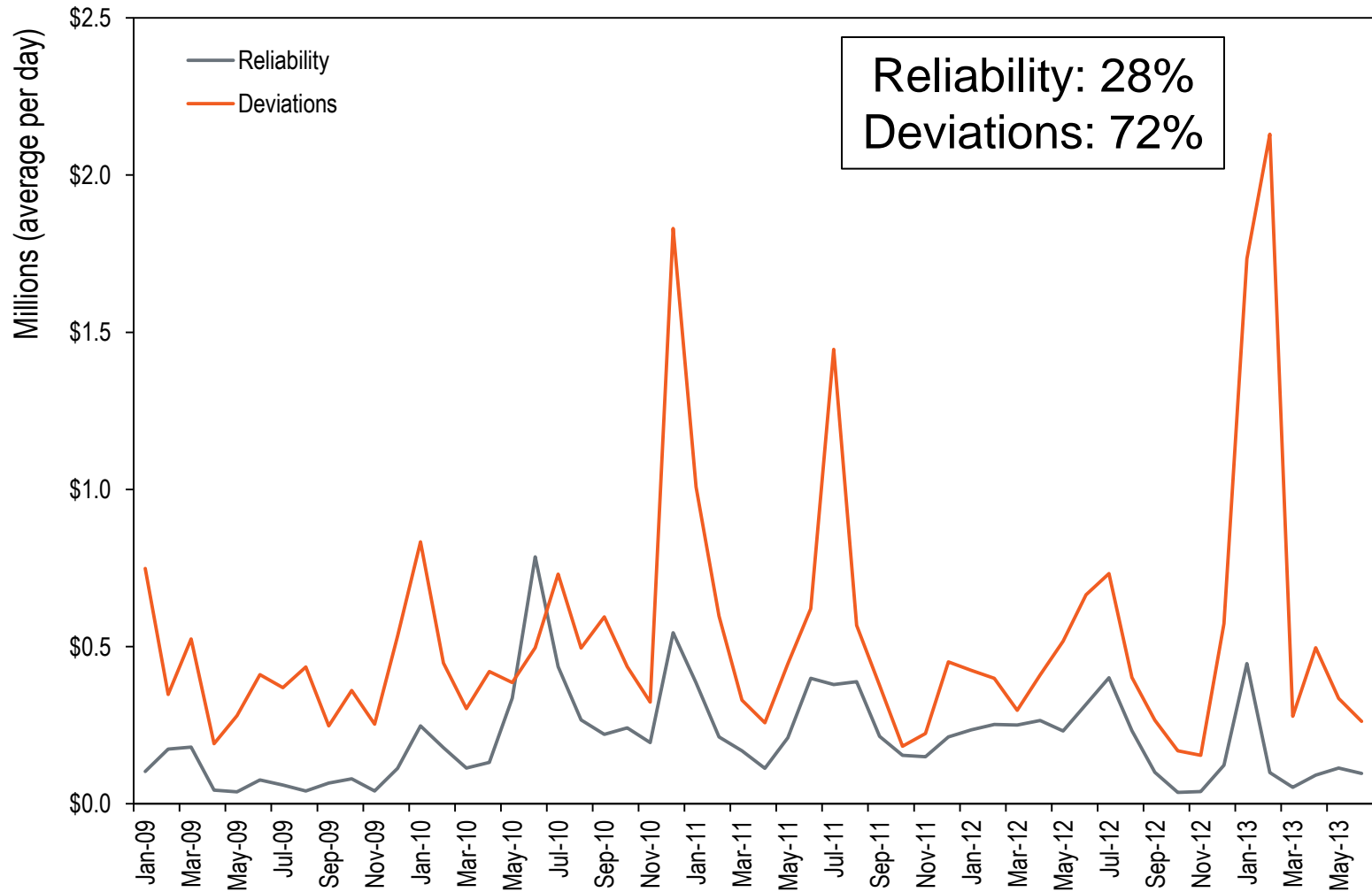
Balancing Top 10 Units Distribution



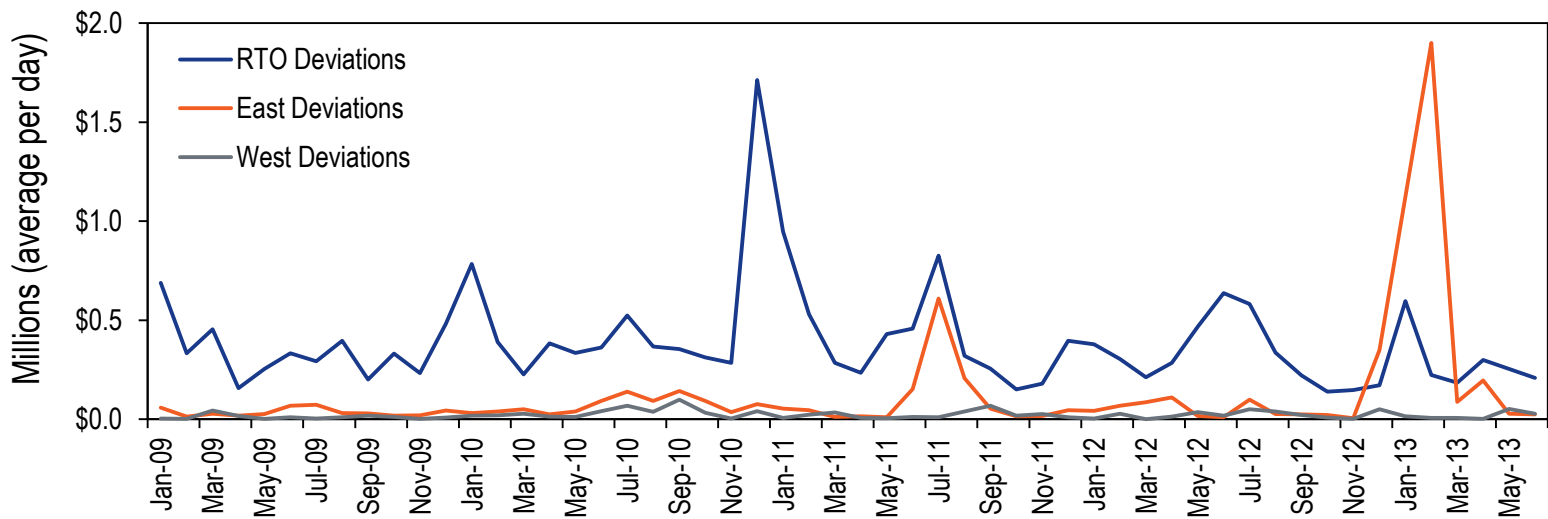
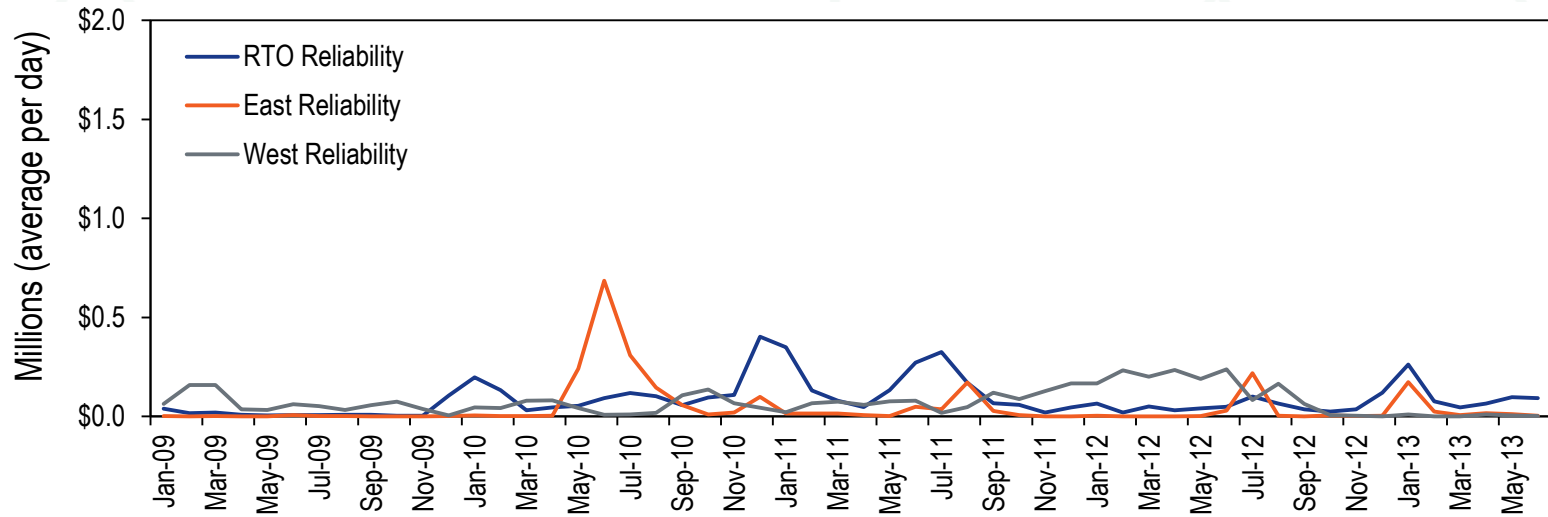
Top 10 Distribution: 113 units.

Unit 1 was in top 10 in 51 months out of 54 months.

Balancing Charges



Balancing Charges



Balancing Charges Allocation

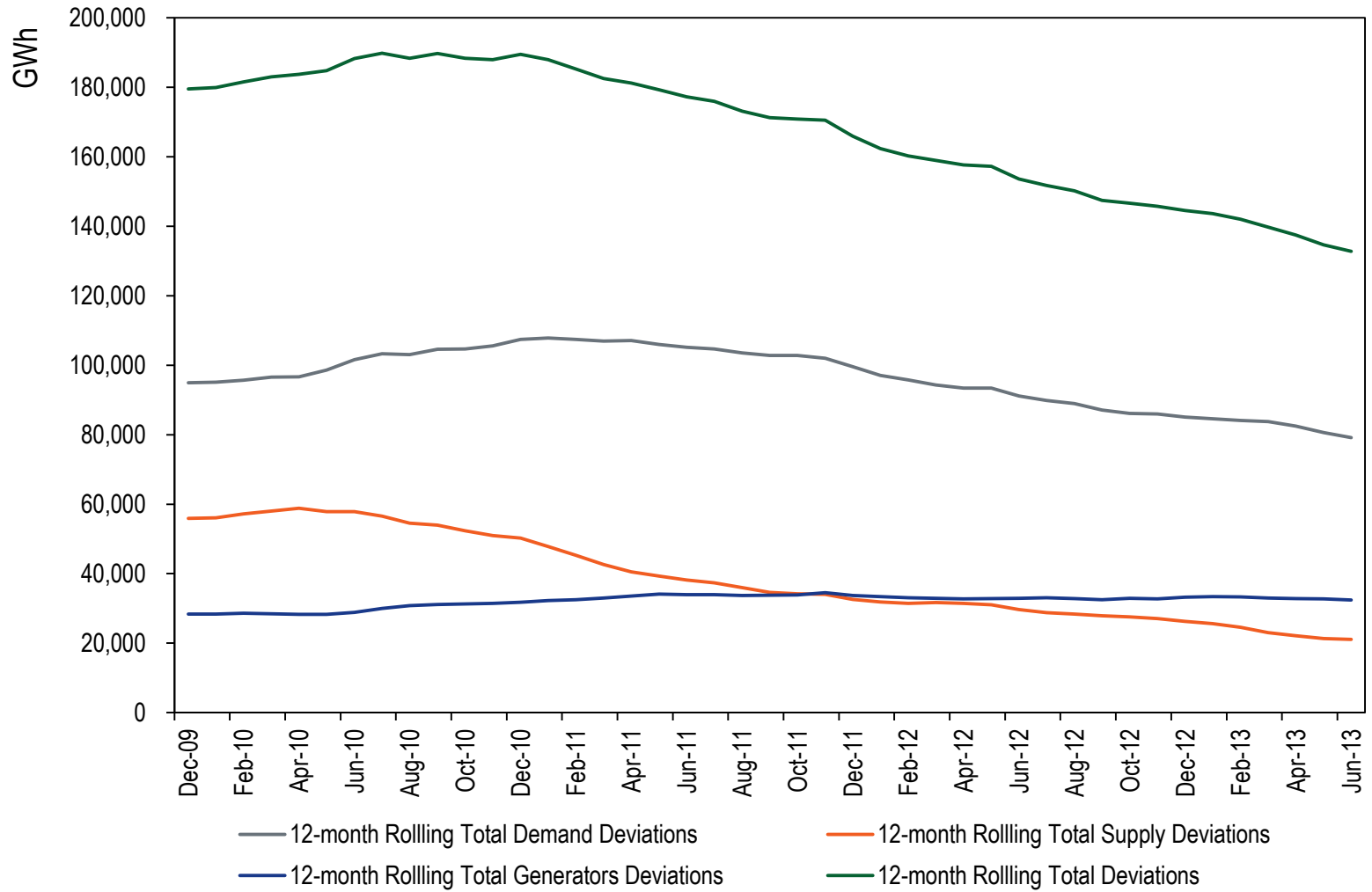
Allocation	Jan 2009 - Nov 2012	Dec 2012 - Jun 2013
Reliability Charges	\$306	\$31
RTO Share	39%	74%
East Share	22%	23%
West Share	39%	3%
Deviation Charges	\$700	\$173
RTO Share	82%	34%
East Share	13%	63%
West Share	4%	3%

Balancing Allocation Recap

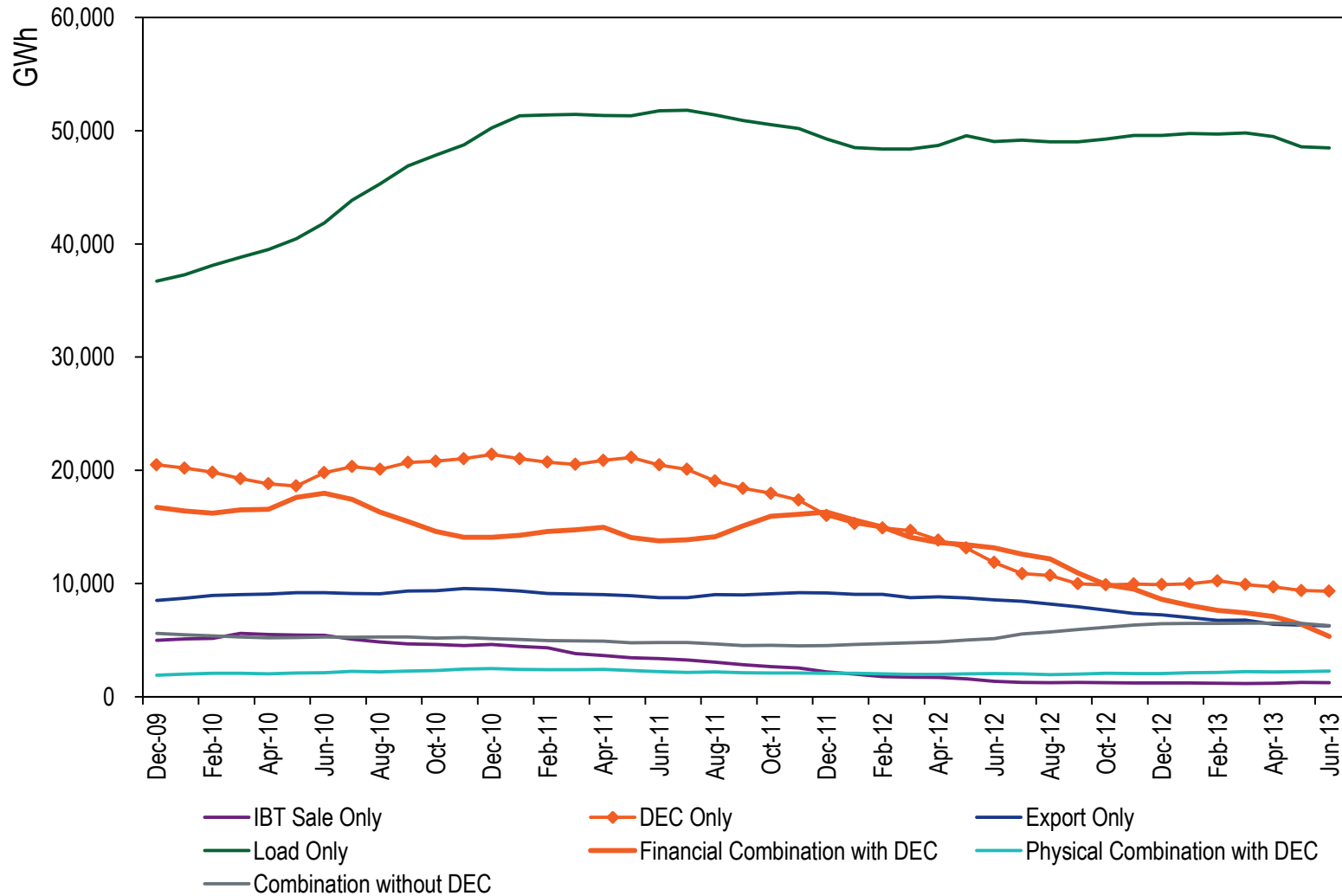
- **Reliability charges are paid by:**
 - Real-time Load
 - Real-time Exports
- **Reliability charges are allocated by region (RTO, East or West)**
- **Deviation charges are paid by:**
 - Real-time deviations from day-ahead position
 - Deviations from desired output (units and DR)
- **Deviation charges are allocated by region (RTO, East or West)**



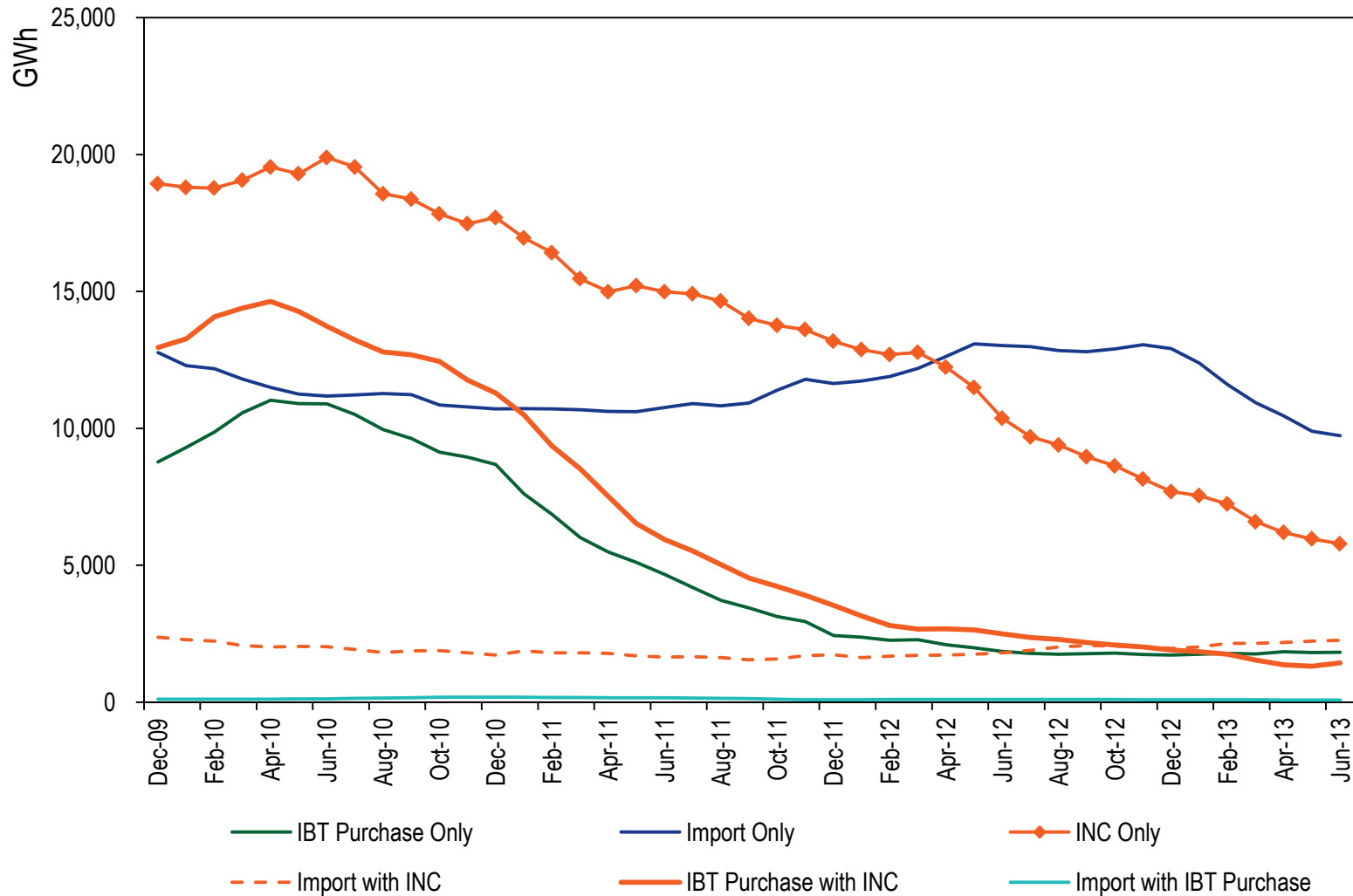
RTO Deviations



RTO Demand Deviations 12-month Rolling Totals



RTO Supply Deviations 12-month Rolling Totals



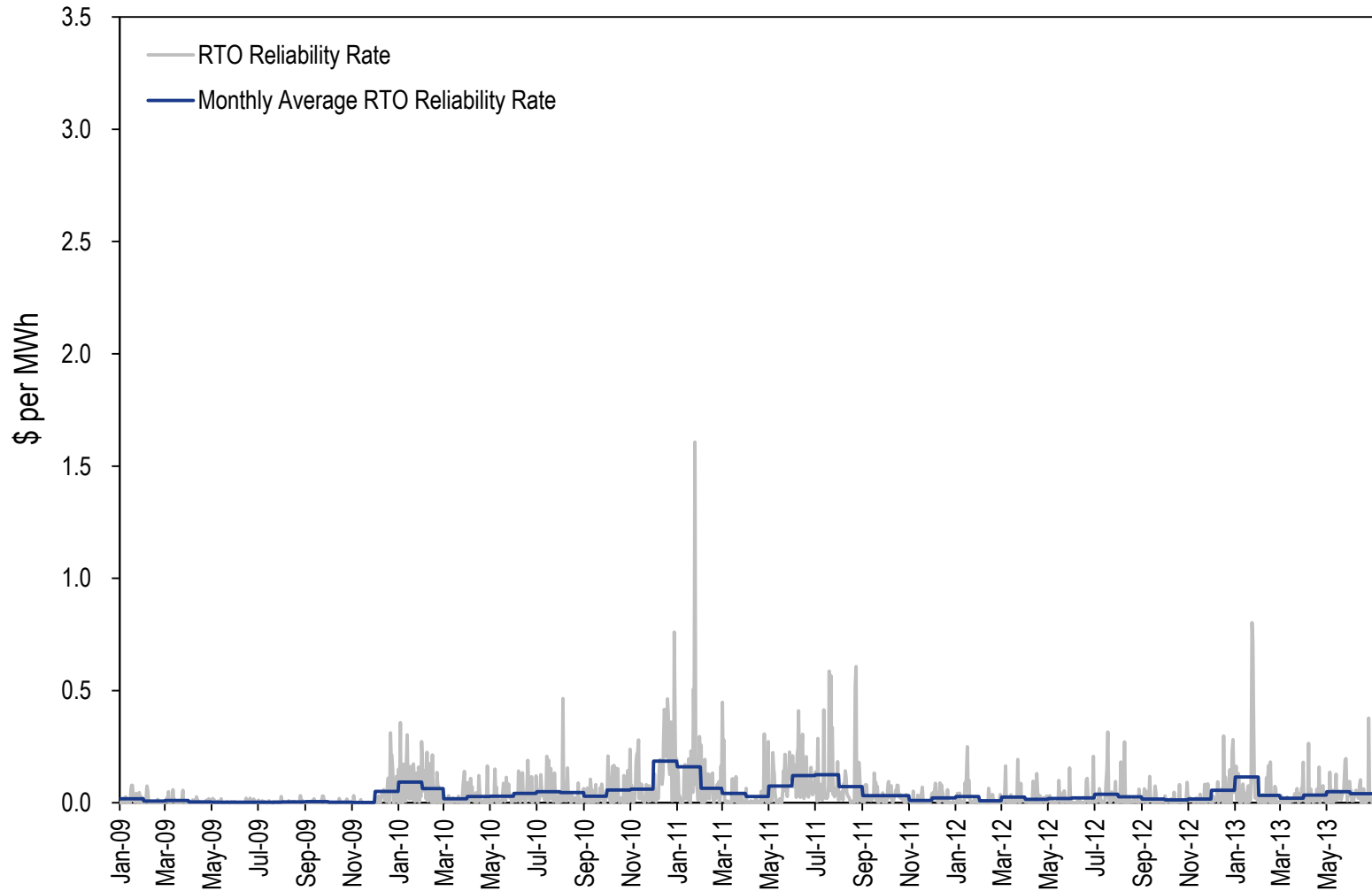
Balancing Rates

Jan 2009 - Nov 2012		Reliability			Deviation		
Statistics	RTO	East	West	RTO	East	West	
Average	0.04	0.04	0.09	0.82	0.23	0.11	
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	
Maximum	1.61	3.08	1.03	13.37	5.18	3.78	
Standard Deviation	0.08	0.17	0.10	0.90	0.56	0.28	

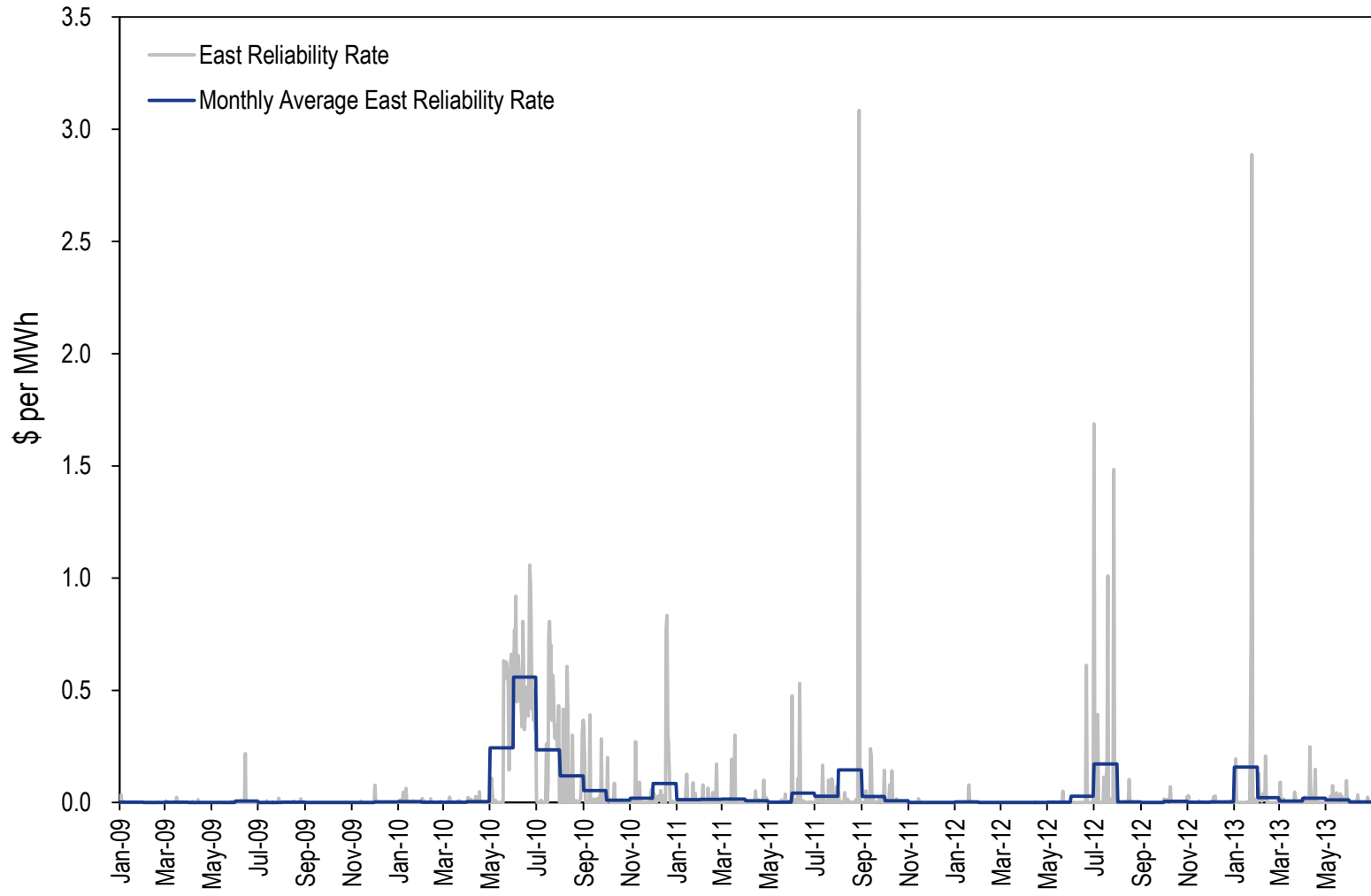
Dec 2012 - Jun 2013		Reliability			Deviation		
Statistics	RTO	East	West	RTO	East	West	
Average	0.05	0.03	0.00	0.77	2.77	0.13	
Minimum	0.00	0.00	0.00	0.01	0.00	0.00	
Maximum	0.80	2.89	0.13	10.23	32.88	2.10	
Standard Deviation	0.09	0.21	0.02	1.16	5.75	0.37	

		Reliability			Deviation		
Average Rates	RTO	East	West	RTO	East	West	
Jan 2009 - Nov 2012	0.04	0.04	0.09	0.82	0.23	0.11	
Dec 2012 - Jun 2013	0.05	0.03	0.00	0.77	2.77	0.13	
Difference	0.01	(0.01)	(0.09)	(0.04)	2.54	0.02	
Percentage	28%	(29%)	(96%)	(5%)	1,122%	22%	

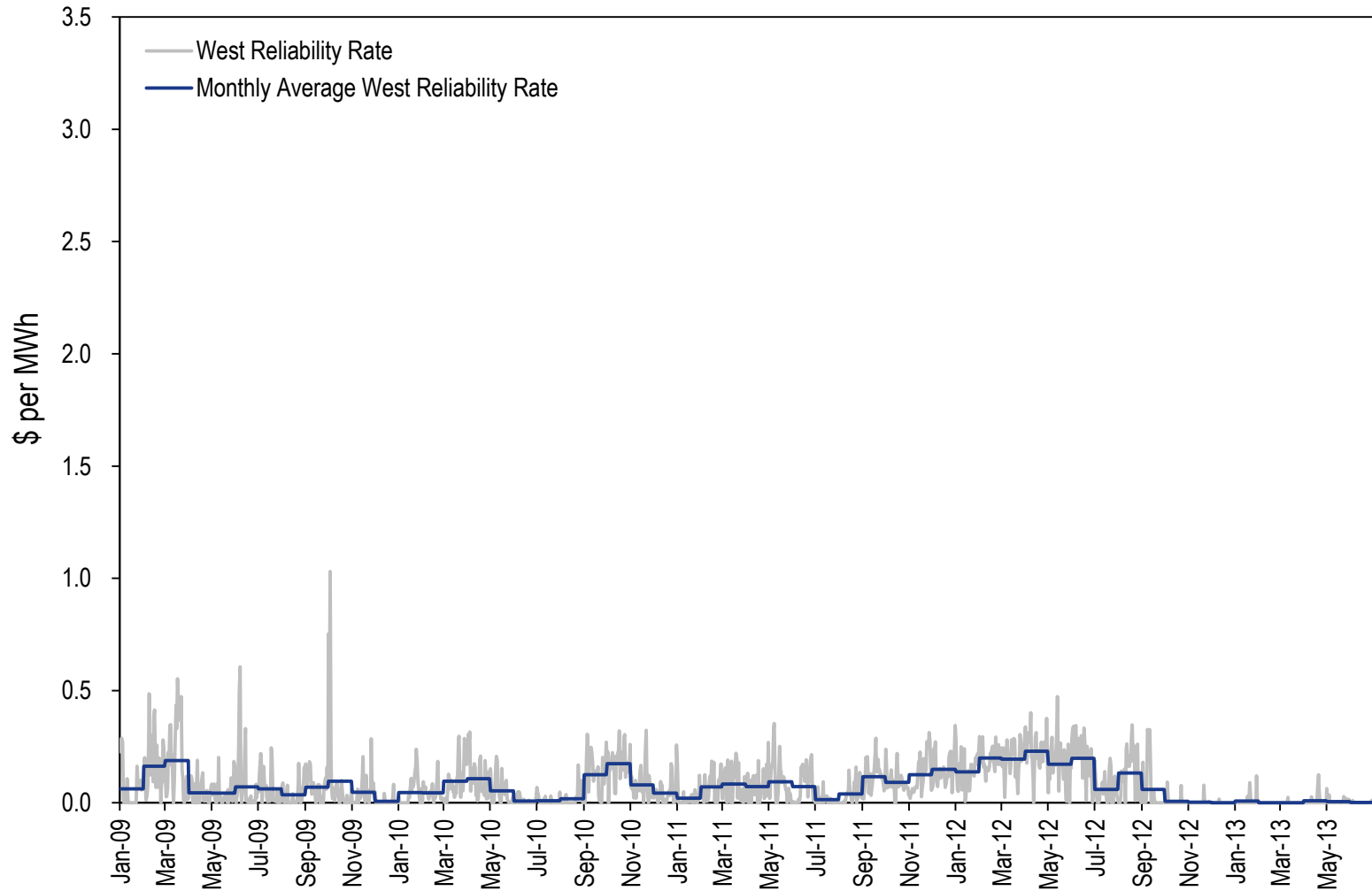
RTO Reliability Rate



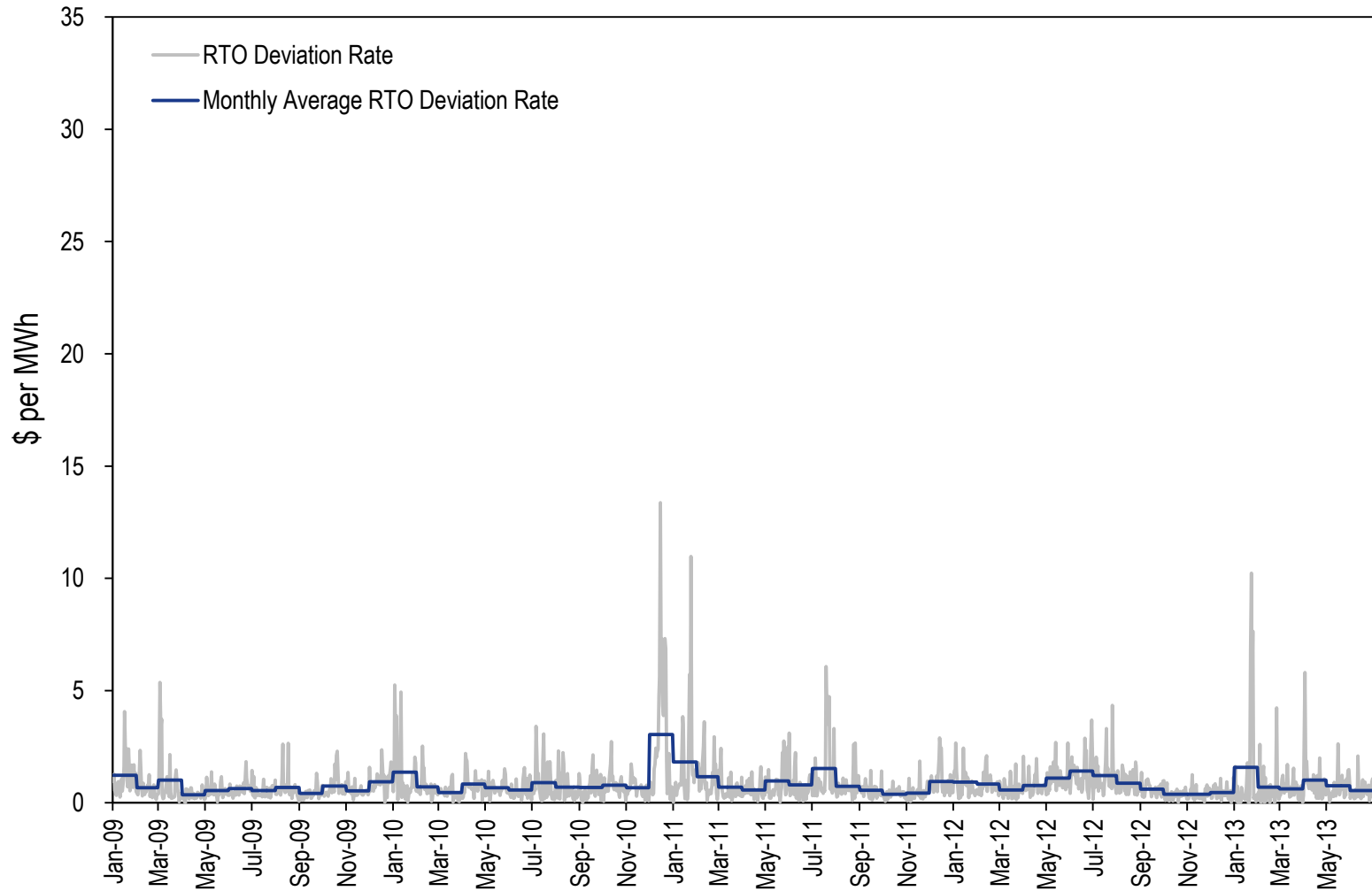
East Reliability Rate



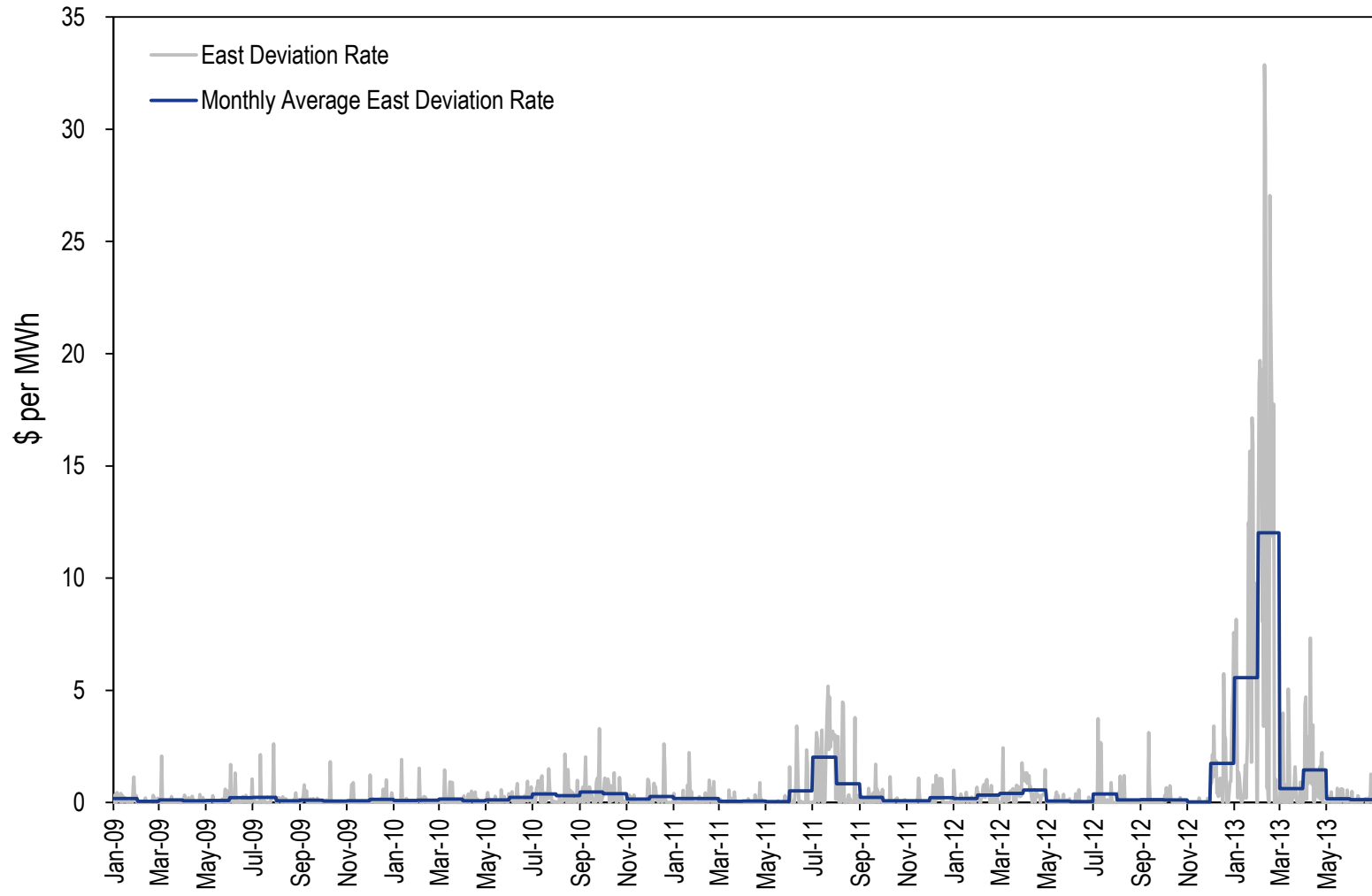
West Reliability Rate



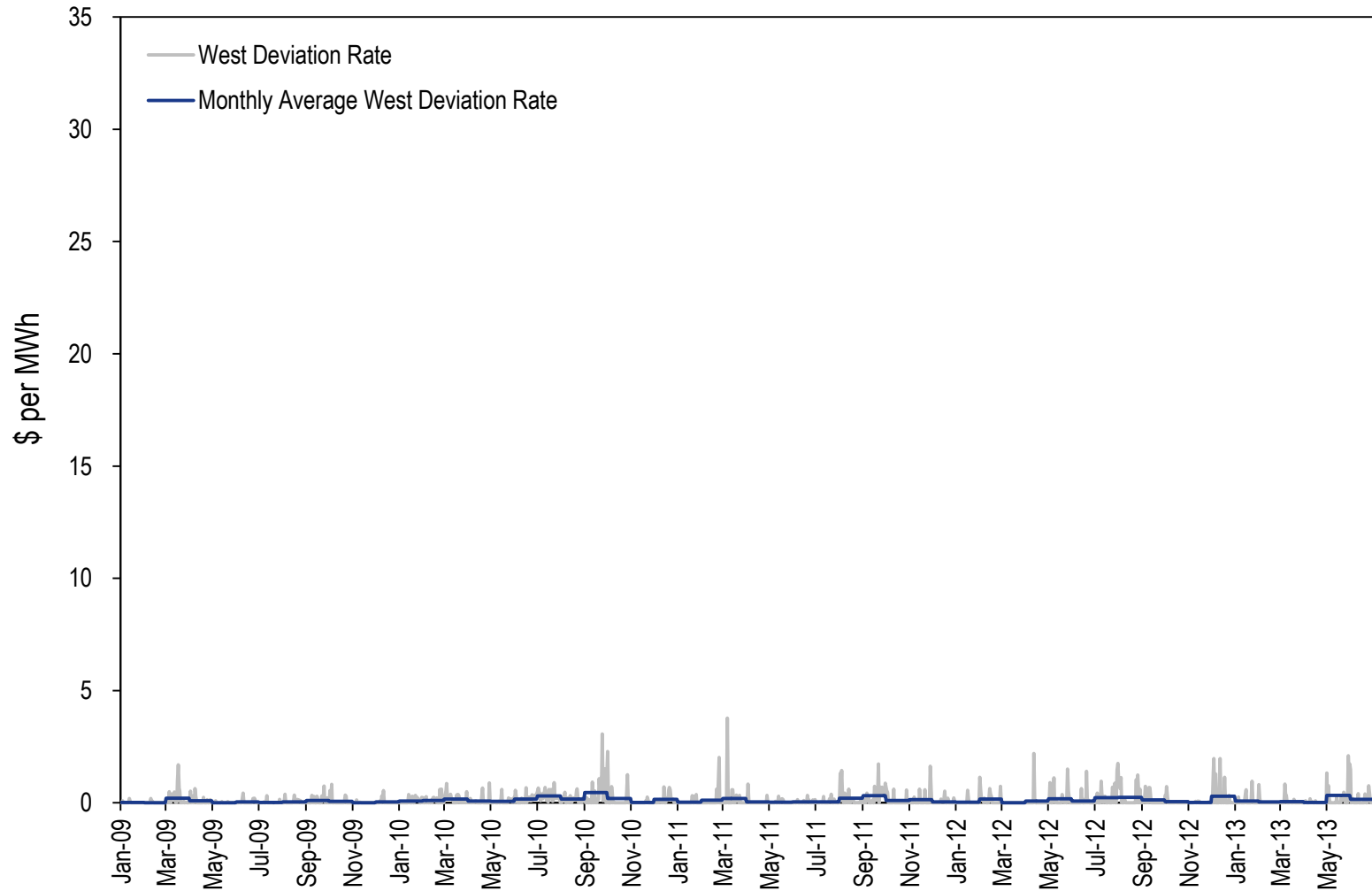
RTO Deviation Rate



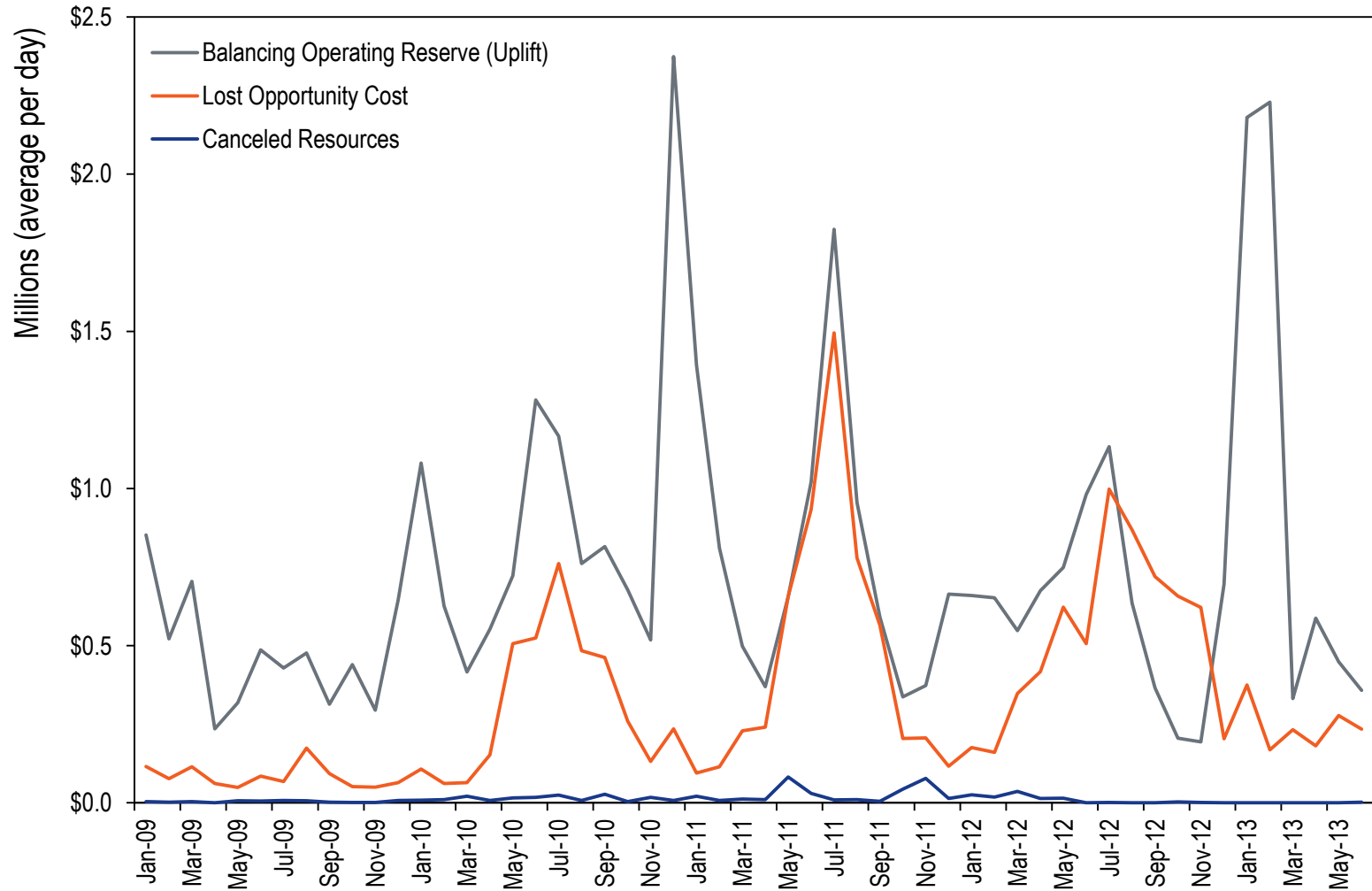
East Deviation Rate



West Deviation Rate



Lost Opportunity Cost

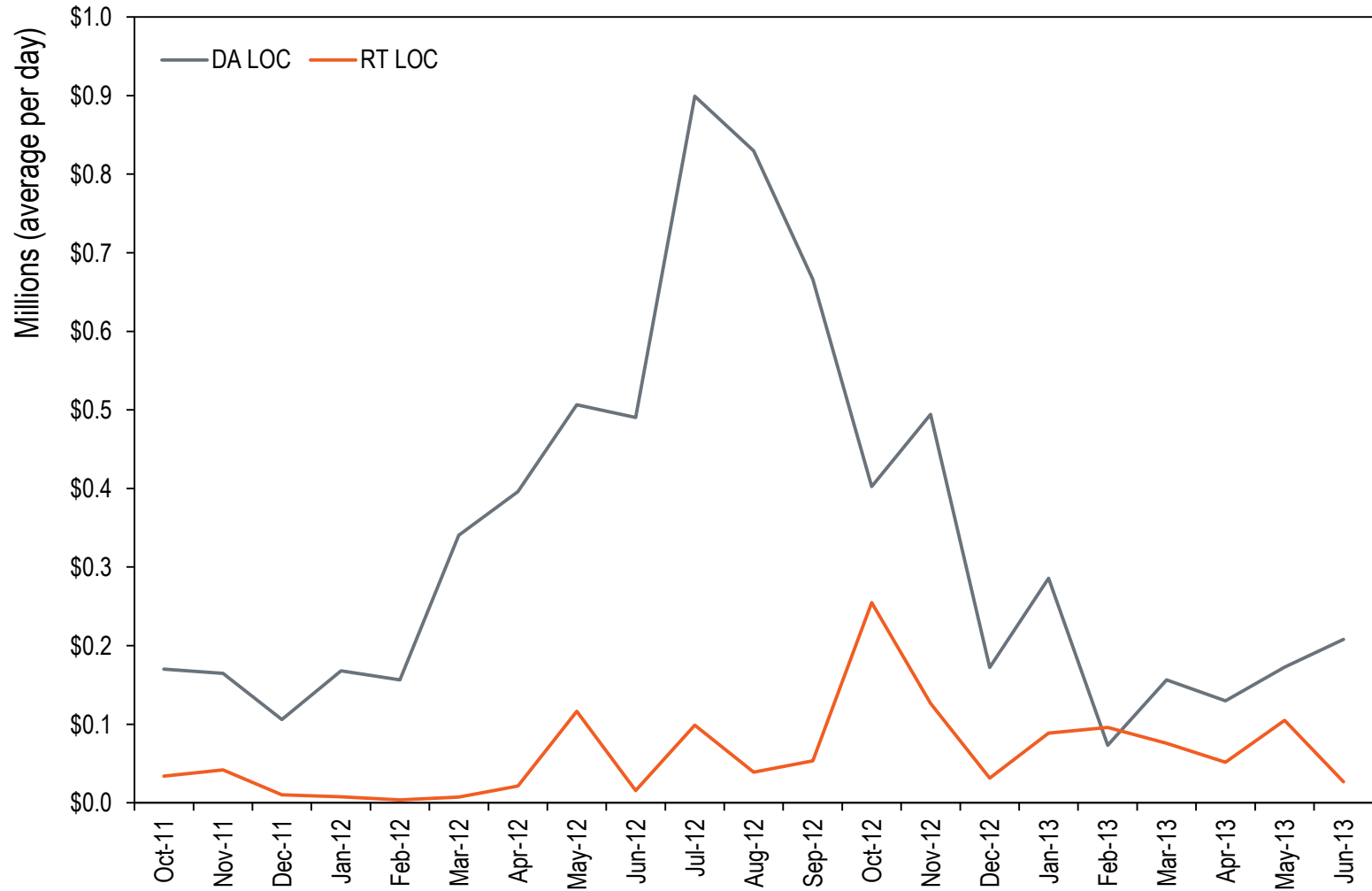


Lost Opportunity Cost Recap

- **LOC is paid to units when:**
 - **Combustion turbine or diesel scheduled DA not called in RT. For purposes of this presentation, labeled as DA LOC.**
 - **Units reduced in real-time. For purposes of this presentation, labeled as RT LOC.**
- **LOC is paid by RTO deviations.**
- **Currently PJM posts one RTO Deviation Rate which combines the RTO Deviation Charges and the LOC Charges.**



Lost Opportunity Cost

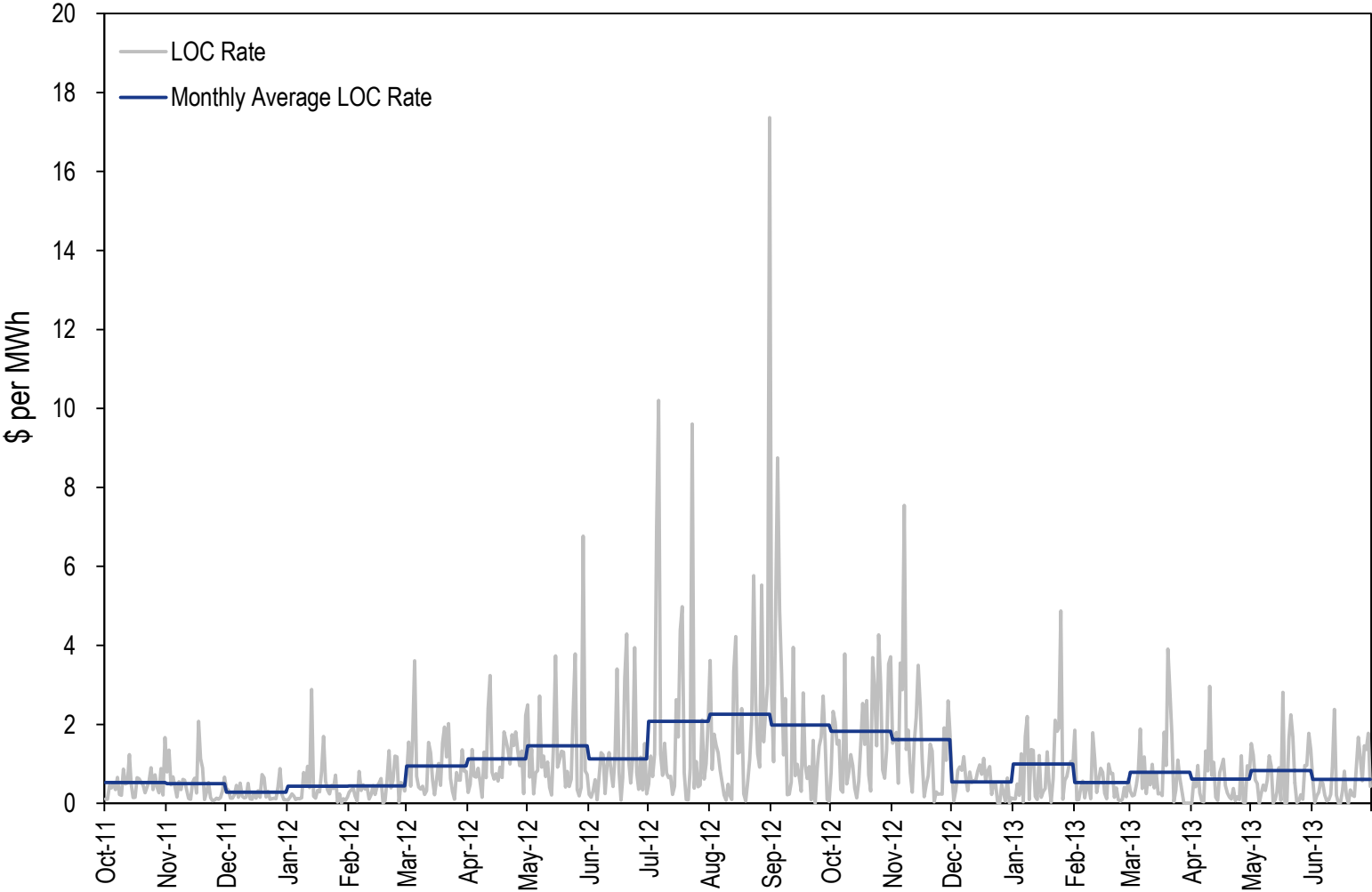


Lost Opportunity Cost

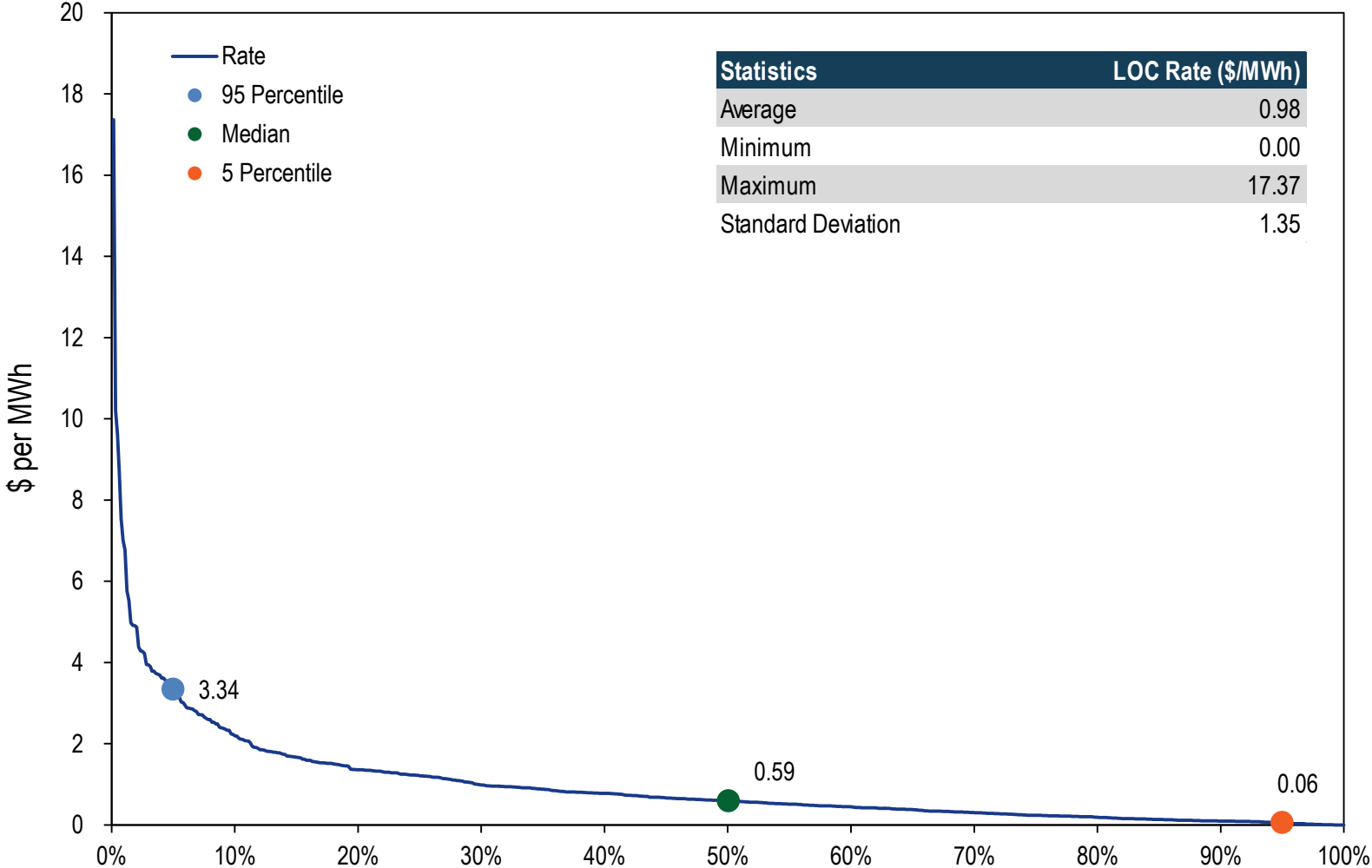
- **LOC from Oct-2011 through Jun-2013: \$253 million**
 - **Oct-2011: LOC calculations in settlement software were corrected to take into account “higher of price vs. cost offer” rule.**
- **DA LOC: \$214 million (84%)**
- **RT LOC: \$40 million (16%)**



LOC Rate



LOC Rate



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