SECTION 7 – CONGESTION

Congestion occurs when available, least-cost energy cannot be delivered to all loads for a period because transmission facilities are not adequate to deliver that energy. When the least-cost available energy cannot be delivered to load in a transmission-constrained area, higher cost units in the constrained area must be dispatched to meet that load.[1] The result is that the price of energy in the constrained area is higher than in the unconstrained area because of the combination of transmission limitations and the cost of local generation. Locational marginal prices (LMPs) reflect the price of the lowest-cost resources available to meet loads, taking into account actual delivery constraints imposed by the transmission system. Thus LMP is an efficient way to price energy when transmission constraints exist. Congestion reflects this efficient pricing.

Congestion reflects the underlying characteristics of the power system including the nature and capability of transmission facilities and the cost and geographical distribution of generation facilities. Congestion is neither good nor bad but is a direct measure of the extent to which there are differences in the cost of generation that cannot be equalized because of transmission constraints. A complete set of markets would require direct competition between investments in transmission and generation. The transmission system provides a physical hedge against congestion. The transmission system is paid for by firm load and, as a result, firm load receives the corollary financial hedge in the form of Auction Revenue Rights (ARRs) and/or Financial Transmission Rights (FTRs). While the transmission system and, therefore, ARRs/FTRs are not guaranteed to be a complete hedge against congestion, ARRs/FTRs do provide a substantial offset to the cost of congestion to firm load.[2]

The Market Monitoring Unit (MMU) analyzed congestion and its influence on PJM markets in the first nine months of 2011.

Highlights

- Congestion costs in the first nine months of 2011 decreased by 25.7 percent over congestion costs in the first nine months of 2010 (Table 7-2).

- Net balancing congestion costs were -$192.9 million in the first nine months of 2011 and -$169.8 million in the first nine months of 2010. Negative balancing congestion costs indicate that the congestion payments in the Day-Ahead Market exceeded congestion payments in the Real-Time Market.

- Measured in terms of the total congestion bill, calculated by subtracting generation congestion credits from load congestion payments plus explicit congestion costs by zone, ComEd was the most congested zone in the first nine months of 2011, despite having, on average, negative congestion components in zonal LMPs. Measured in these terms, ComEd accounted for 22.2 percent of the total congestion cost (Table 7-21). In the first nine months of 2010, AP was the most congested zone, accounting for 19.8 percent of the total net congestion cost (Table 7-22.)[3]

- Monthly congestion costs in the first nine months of 2011 were lower than monthly congestion costs in the same period in 2010, with the exception of January and March (Table 7-3).

- PJM backbone transmission projects are a subset of significant baseline transmission upgrades. The backbone upgrades are typically intended to resolve a wide range of reliability criteria violations and congestion issues and have substantial impacts on energy and capacity markets.

  On August 18, 2011, the PJM Board of Managers instructed Pepco Holdings, Inc. (PHI) that the MAPP in-service date of 2015 was moved to 2019-2021, and advised PHI to sustain efforts needed to allow the MAPP project to be resumed.

  In October 2011, the Rapid Response Team for Transmission, a federal interagency team led by the White House Council on Environmental Quality, included the Susquehanna-Roseland power line project in its list of seven transmission line projects for rapid review and permit process.

1 This is referred to as dispatching units out of economic merit order. Economic merit order is the order of all generator offers from lowest to highest cost. Congestion occurs when loadings on transmission facilities mean the next unit in merit order cannot be used and a higher cost unit must be used in its place.

2 See the *2010 State of the Market Report for PJM*, Volume II, Section 8, "Financial Transmission and Auction Revenue Rights," at "ARR and FTR Revenue and Congestion."

3 Since the *2008 State of the Market Report* the MMU has provided load congestion payments and generation congestion credits calculated as constraint specific net congestion costs by organization by zone. Load congestion payments and generation congestion credits are calculated by constraint for each zone. Within each zone, where constraint specific congestion payments and credits are of the same sign, the payments and credits are netted by organization within the zone. For a specific constraint, this results in an organization being assigned either net generation congestion credits or net load congestion charges within a zone. All net generation credits and net congestion payments are summed across organizations within each zone to determine the total congestion generation credits, total congestion load charges and total net congestion charges by zone. These results are used to calculate system-wide total congestion generation credits and total congestion load charges.

Recommendations

- In this *2011 Quarterly State of the Market Report for PJM: January through September*, the recommendations from the *2010 State of the Market Report for PJM* remain MMU recommendations.

Overview

Congestion Cost

- Total congestion costs equal net congestion costs plus explicit congestion costs. Net congestion costs equal load congestion payments minus generation congestion credits. Explicit congestion costs are the net congestion costs associated with point-to-point energy transactions. Each of these categories of congestion costs is comprised of day-ahead and balancing congestion costs. Day-ahead congestion costs are based on day-ahead MWh while balancing congestion costs are based on deviations between day-ahead and real-time MWh priced at the congestion price in the Real-Time Energy Market.

- Congestion charges can be both positive and negative. When a constraint binds, the price effects of that constraint vary. The system marginal price (SMP) is uniform for all areas, while the congestion components of Locational Marginal Price (LMP) will either be positive or negative in a specific area, meaning that actual LMPs are above or below the SMP.[4] If an area is downstream from the constrained element, the area will experience positive congestion costs. If an area is upstream from the constrained element, the area will experience negative congestion costs.

- Day-ahead congestion charges and credits are based on MWh and LMP in the Day-Ahead Energy Market. Balancing congestion charges and credits are based on load or generation deviations between the Day-Ahead and Real-Time Energy Markets and LMP in the Real-Time Energy Market. If a participant has real-time generation or load that is greater than its day-ahead generation or load then the deviation will be positive. If there is a positive load deviation at a bus where real-time LMP has a positive congestion component, positive balancing congestion costs will result. Similarly, if there is a positive load deviation at a bus where real-time LMP has a negative congestion component, negative balancing congestion costs will result. If a participant has real-time generation or load that is less than its day-ahead generation or load then the deviation will be negative. If there is a negative load deviation at a bus where real-time LMP has a positive congestion component, negative balancing congestion costs will result. Similarly, if there is a negative load deviation at a bus where real-time LMP has a positive congestion component, negative balancing congestion costs will result.

- **Total Congestion.** Total congestion costs decreased by $292.1 million or 25.7 percent, from $1,138.5 million in the first nine months of 2010 to $846.4 million in the first nine months of 2011. Day-ahead congestion costs decreased by $269.1 million or 20.6 percent, from $1,308.3 million in the first nine months of 2010 to $1,039.2 million in the first nine months of 2011. Balancing congestion costs decreased by $23.1 million or 13.6 percent from -$169.8 million in the first nine months of 2010 to -$192.9 million in the first nine months of 2011. On June 1, 2011, PJM integrated the American Transmission Systems, Inc. (ATSI) Control Zone. The metrics reported in this section treat ATSI as part of MISO for the period from January through May and as part of PJM for the period from June through September.

- **Monthly Congestion.** Fluctuations in monthly congestion costs continued to be substantial. In the first nine months of 2011, these differences were driven by varying load and energy import levels, different patterns of generation, weather-induced changes in demand and variations in congestion frequency on constraints affecting large portions of PJM load. Monthly congestion costs in the first nine months of 2011 ranged from $35.5 million in May to $241.8 million in January.

Congestion Component of LMP and Facility or Zonal Congestion

- **Congestion Component of Locational Marginal Price (LMP).** To provide an indication of the geographic dispersion of congestion costs, the congestion component of LMP (CLMP) was calculated for control zones in PJM. Price separation among eastern, southern and western control zones in PJM was primarily a result of congestion on the AP South interface, the 5004/5005 interface, the Belmont transformer, West Interface, and the AEP-Dominion interface. (Table 7-13)

- **Congested Facilities.** Congestion frequency continued to be significantly higher in the Day-Ahead Market than in the Real-Time

4 The SMP is the price of the distributed load reference bus. The price at the reference bus is equivalent to the five minute real-time or hourly day-ahead load weighted PJM LMP.

Market in 2011.[5] Day-ahead congestion frequency increased by 35.7 percent from 75,783 congestion event hours in the first nine months of 2010 to 102,830 congestion event hours in the first nine months of 2011. Day-ahead, congestion-event hours decreased on internal PJM interfaces while congestion-event hours increased on transmission lines, transformers and reciprocally coordinated flowgates between PJM and the Midwest Independent Transmission System Operator, Inc. (MISO).

Real-time congestion frequency decreased by 3.6 percent from 17,240 congestion event hours in the first nine months of 2010 to 16,613 congestion event hours in the first nine months of 2011. Real-time, congestion-event hours decreased on the internal PJM interfaces and transmission lines, while congestion-event hours increased on transformers and reciprocally coordinated flowgates between PJM and MISO.

Facilities were constrained in the Day-Ahead Market more frequently than in the Real-Time Market. During the first nine months of 2011, for only 6.1 percent of Day Ahead Market facility constrained hours were the same facilities also constrained in the Real Time Market. During the first nine months of 2011, for 37.3 percent of Real Time Market facility constrained hours, the same facilities were also constrained in the Day Ahead Market.

The AP South Interface was the largest contributor to congestion costs in the first nine months of 2011. With $215.7 million in total congestion costs, it accounted for 25.5 percent of the total PJM congestion costs in the first nine months of 2011. The top five constraints in terms of congestion costs together contributed $423.5 million, or 50.0 percent, of the total PJM congestion costs in the first nine months of 2011. The top five constraints were the AP South interface, the 5004/5005 interface, the Belmont transformer, West interface and the AEP – Dominion interface.

- **Zonal Congestion.** Measured in terms of the total congestion bill, calculated by subtracting generation congestion credits from load congestion payments plus explicit congestion costs by zone, ComEd was the most congested zone in the first nine months of 2011. ComEd had –$296.8 million in total load charges, -$506.4 million in total generation credits and -$21.8 million in explicit congestion, providing $187.8 million in total net congestion charges, reflecting significant local congestion between local generation and load, despite being on the upstream side of system wide congestion patterns. The Crete – St. Johns flowgate (a reciprocally coordinated flowgate between PJM and MISO) and Electric Junction – Nelson transmission line, AP South interface, East Frankfort – Crete transmission line and the Pleasant Valley – Belvidere transmission line contributed $88.7 million, or 47.2 percent of the total ComEd Control Zone congestion costs.

  Similarly, the AEP Control Zone recorded the second highest congestion cost in PJM in the first nine months of 2011, with $163.3 million. The AP South interface contributed $31.5 million, or 19.3 percent of the total AEP Control Zone congestion cost in the first nine months of 2011. The AP Control Zone recorded the third highest congestion cost in PJM in the first nine months of 2011, with a cost of $130.1 million. The AP South interface contributed $59.0 million, or 45.4 percent of the total AP Control Zone congestion cost in the first nine months of 2011. The control zones in the Western and Southern regions accounted for $589.84 million, or 69.7 percent of congestion cost and the control zones in the Eastern region accounted for $256.56 million or 30.3 percent of congestion cost.

- **Regional and Zonal Congestion.** Tables reporting regional and zonal congestion have been moved from this section of the report to Appendix A.[6]

- **Ownership.** In the PJM market, both physical and financial participants make virtual supply offers (increments) and virtual demand bids (decrements). A participant is classified as a physical entity if the entity primarily takes physical positions in PJM markets. Physical entities include utilities and wholesale customers. Financial entities include banks, hedge funds, retail service providers and speculators, who primarily take financial positions in PJM markets. All affiliates are considered a single entity for this categorization. For example, under this classification, the trading affiliate of a utility would be treated as a physical company. In the first nine months of 2011, financial companies as a group were net recipients of congestion credits, whereas physical companies were net payers of congestion charges. In the first nine months of 2011, financial companies received net $79.5 million, a decrease of $22.1 million or 21.8 percent compared to the first nine months of 2010. In the first nine months of 2011, physical companies

5 In order to have a consistent metric for real-time and day-ahead congestion frequency, real-time congestion frequency is measured using the convention that an hour is constrained if any of its component five-minute intervals is constrained.

6 See the *Quarterly State of the Market Report for PJM: January through September*, Appendix A.

paid net $925.9 million in congestion charges, a decrease of $314.1 million or 25.3 percent compared to the first nine months of 2010.

Key Backbone Facilities

PJM baseline transmission projects are implemented to resolve reliability criteria violations. PJM backbone transmission projects are a subset of significant baseline projects. The backbone projects are typically intended to resolve a wide range of reliability criteria violations and congestion issues and have substantial impacts on energy and capacity markets. The current backbone projects are: Mount Storm – Doubs; Jacks Mountain; Mid-Atlantic Power Pathway (MAPP); Potomac – Appalachian Transmission Highline (PATH); and Susquehanna – Roseland.

On August 18, 2011, the PJM Board of Managers instructed Pepco Holdings, Inc. (PHI) to delay the construction of the MAPP transmission line. The PJM RTEP analysis, using the most current economic forecasts, demand response commitments and potential new generation, showed that the MAPP project can be delayed. As a result, the initial MAPP in-service date of 2015 has been moved to 2019-2021. The PJM Board of Managers advised PHI to sustain efforts needed to allow the MAPP project to be resumed when it is needed.[7]

In early October 2011, the Interagency Rapid Response Team for Transmission named the Susquehanna-Roseland power line project to the initial list of seven transmission line projects for rapid review and permit process. The Rapid Response Team is a federal interagency team consisting of the following agencies: the Department of Agriculture, the Department of Commerce, the Department of Defense, the Department of Energy, the Department of the Interior, the Environmental Protection Agency, the Federal Electric Regulatory Commission, the Advisory Council on Historic Preservation and the White House Council on Environmental Quality.[8] The Rapid Response Team for Transmission was implemented to coordinate, improve and accelerate the permitting process for critical transmission line projects in other to improve overall reliability of the US power grid.[9]

7 See “PJM Board directs delay in MAPP Transmission Line” (Accessed October 22, 2011) <http://www.pjm.com/about-pjm/newsroom/newsletter-notices/state-lines/2011/september.aspx#Article_4>.

8 See “Interagency Rapid Response Team for Transmission” (Accessed October 28, 2011) <http://www.whitehouse.gov/administration/eop/ceq/initiatives/interagency-rapid-response-team-for-transmission>.

9 See “PJM Issues Statement on Rapid Response Team Selection of Susquehanna-Roseland Project” (Accessed October 24, 2011) <http://www.pjm.com/~/media/about-pjm/newsroom/2011-releases/20111005-pjm-issues-statement-on-rapid-response-team-selection-of-susquehanna-roseland-project.ashx>.

Conclusion

Congestion reflects the underlying characteristics of the power system, including the nature and capability of transmission facilities, the cost and geographical distribution of generation facilities and the geographical distribution of load. Total congestion costs decreased by $292.1 million or 25.7 percent, from $1,138.5 million in the first nine months of 2010 to $846.4 million in the first nine months of 2011. Day-ahead congestion costs decreased by $269.1 million or 20.6 percent, from $1,308.3 million in the first nine months of 2010 to $1,039.2 million in the first nine months of 2011. Balancing congestion costs decreased by $23.1 million or 13.6 percent, from -$169.8 million in the first nine months of 2010 to -$192.9 million in the first nine months of 2011. Congestion costs were significantly higher in the Day-Ahead Market than in the Real-Time Market. Congestion frequency was also significantly higher in the Day-Ahead Market than in the Real-Time Market. Day-ahead congestion frequency increased 35.7 percent from 75,783 congestion event hours in the first nine months of 2010 to 102,830 congestion event hours in the first nine months of 2011. Real-time congestion frequency decreased 3.6 percent from 17,240 congestion event hours in the first nine months of 2010 to 16,613 congestion event hours in the first nine months of 2011.

ARRs and FTRs served as an effective, but not complete, hedge against congestion. ARR and FTR revenues hedged 96.9 percent of the total congestion costs in the Day-Ahead Energy Market and the balancing energy market for the 2010 to 2011 planning period. For the first four months (June through September) of the 2011 to 2012 planning period, total ARR and FTR revenues hedged more than 100 percent of the congestion costs within PJM.[10] FTRs were paid at 84.9 percent of the target allocation level for the full 2010 to 2011 planning period, and at 90.9 percent of the target allocation level for the first four months (June through September) of the 2011 to 2012 planning period.[11]

The AP South Interface was the largest contributor to congestion costs in the first nine months of 2011, accounting for 25.5 percent of total congestion costs in the first nine months of 2010. The top five constraints accounted for 50.0 percent of total congestion costs.

10 See the *2011 Quarterly State of the Market Report for PJM: January through September,* Section 8, “Financial Transmission and Auction Revenue Rights,” at Table 8-18, “ARR and FTR congestion hedging: Planning periods 2009 to 2010 and 2010 to 2011.”

11 See the *2011 Quarterly State of the Market Report for PJM: January through September,* Section 8, “Financial Transmission and Auction Revenue Rights,” at Table 8-16, “Monthly FTR accounting summary (Dollars (Millions)): Planning periods 2010 to 2011 and 2011 to 2012 through September 30, 2011”.

Congestion

Total Calendar Year Congestion

Table 7-1 Total PJM congestion (Dollars (Millions)): January through September for calendar years 2006 to 2011 (See 2010 SOM, Table 7-1)

	Congestion Charges	Percent Change
2006 (Jan - Sep)	$1,424	NA
2007 (Jan - Sep)	$1,382	(3%)
2008 (Jan - Sep)	$1,843	33%
2009 (Jan - Sep)	$544	(71%)
2010 (Jan - Sep)	$1,139	109%
2011 (Jan - Sep)	$846	(26%)

Table 7-2 Total annual PJM congestion costs by category (Dollars (Millions)): January through September, 2010 and 2011 (See 2010 SOM, Table 7-2)

	Congestion Costs (Millions)			
Year	Load Payments	Generation Credits	Explicit	Total
2010 (Jan - Sep)	$301.2	($886.2)	($48.9)	$1,138.5
2011 (Jan - Sep)	$421.1	($530.0)	($104.7)	$846.4

Monthly Congestion

Table 7-3 Monthly PJM congestion charges (Dollars (Millions)): January through September, 2010 and 2011 (See 2010 SOM, Table 7-3)

	2010	2011	Change	Percent Change
Jan	$218.3	$241.8	$23.5	10.8%
Feb	$106.4	$74.0	($32.4)	(30.4%)
Mar	$20.4	$44.1	$23.7	116.4%
Apr	$42.5	$39.0	($3.6)	(8.4%)
May	$68.5	$35.5	($33.0)	(48.2%)
Jun	$188.5	$125.0	($63.5)	(33.7%)
Jul	$268.9	$161.1	($107.8)	(40.1%)
Aug	$105.1	$59.5	($45.6)	(43.4%)
Sep	$119.9	$66.5	($53.4)	(44.6%)
Total	$1,138.5	$846.4	($292.1)	(25.7%)

Congestion Component of LMP

Table 7-4 Annual average congestion component of LMP: January through September 2010 and 2011 (See 2010 SOM, Table 7-4)

	2010 (Jan - Sep)		2011 (Jan - Sep)	
Control Zone	Day Ahead	Real Time	Day Ahead	Real Time
AECO	$3.16	$3.87	$3.74	$3.69
AEP	($4.63)	($5.23)	($2.79)	($3.41)
AP	($0.28)	($0.42)	$0.06	($0.02)
ATSI	$0.00	$0.00	($2.53)	($3.21)
BGE	$6.15	$6.72	$4.29	$5.01
ComEd	($6.65)	($7.87)	($6.28)	($7.23)
DAY	($5.17)	($5.92)	($3.62)	($3.92)
DLCO	($4.71)	($6.08)	($3.55)	($3.61)
DPL	$3.24	$3.99	$3.32	$2.97
Dominion	$5.93	$5.31	$3.30	$3.45
JCPL	$2.55	$2.79	$3.06	$3.44
Met-Ed	$4.03	$3.78	$2.77	$2.78
PECO	$2.90	$2.99	$3.42	$3.04
PENELEC	($1.34)	($2.36)	($0.41)	($0.41)
Pepco	$7.39	$6.61	$5.01	$3.79
PPL	$2.29	$2.38	$3.04	$3.15
PSEG	$3.04	$3.59	$3.76	$4.07
RECO	$2.16	$2.04	$1.20	($0.70)

Congested Facilities

Congestion by Facility Type and Voltage

Table 7-5 Congestion summary (By facility type): January through September 2011 (See 2010 SOM, Table 7-5)

	Congestion Costs (Millions)									Event Hours	
	Day Ahead				Balancing						
Type	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
Flowgate	($1.0)	($67.6)	$9.6	$76.2	$6.3	$9.2	($59.5)	($62.4)	$13.8	15,136	4,251
Interface	$137.7	($275.5)	($13.3)	$399.9	$28.6	$30.3	$11.4	$9.7	$409.6	7,091	1,607
Line	$123.6	($194.8)	$25.9	$344.4	$14.9	$39.8	($60.1)	($85.0)	$259.4	59,093	7,332
Other	$1.9	($1.5)	$0.6	$4.0	$1.4	$4.0	($0.2)	($2.8)	$1.2	622	145
Transformer	$106.0	($83.0)	$18.0	$207.1	($0.6)	$10.1	($37.3)	($48.0)	$159.0	20,874	3,278
Unclassified	$1.6	($1.1)	$5.0	$7.7	$0.8	$0.2	($4.9)	($4.3)	$3.4	NA	NA
Total	$369.8	($623.6)	$45.8	$1,039.2	$51.3	$93.6	($150.5)	($192.9)	$846.4	102,816	16,613

Table 7-6 Congestion summary (By facility type): January through September 2010 (See 2011 SOM, Table 7-6)

	Congestion Costs (Millions)									Event Hours	
	Day Ahead				Balancing						
Type	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
Flowgate	($0.1)	($32.0)	$5.1	$37.0	($2.8)	$3.0	($21.8)	($27.7)	$9.4	4,168	1,668
Interface	$68.6	($504.1)	$4.6	$577.2	$18.8	$13.4	($3.6)	$1.8	$579.1	7,612	2,020
Line	$145.9	($318.2)	$48.9	$513.0	($23.1)	$20.0	($78.8)	($121.9)	$391.1	53,605	11,109
Other	($0.0)	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0	0
Transformer	$92.5	($70.2)	$6.2	$168.9	($3.0)	$5.0	($14.2)	($22.1)	$146.7	10,398	2,443
Unclassified	$4.3	($3.1)	$4.7	$12.2	$0.0	$0.0	$0.0	$0.0	$12.2	NA	NA
Total	$311.2	($927.5)	$69.5	$1,308.3	($10.1)	$41.3	($118.4)	($169.8)	$1,138.5	75,783	17,240

Table 7-7 Congestion Event Hours (Day Ahead against Real Time): January through September 2010 and 2011 (See 2010 SOM, Table 7-7)

	Congestion Event Hours					
	2011 (Jan - Sep)			2010 (Jan - Sep)		
Type	Day Ahead Constrained	Corresponding Real Time Constrained	Percent	Day Ahead Constrained	Corresponding Real Time Constrained	Percent
Flowgate	15,136	1,632	10.8%	4,168	440	10.6%
Interface	7,091	1,021	14.4%	7,612	1,333	17.5%
Line	59,093	2,125	3.6%	53,605	3,938	7.3%
Other	622	2	0.3%	0	0	0.0%
Transformer	20,874	1,475	7.1%	10,398	957	9.2%
Total	102,816	6,255	6.1%	75,783	6,668	8.8%

Table 7-8 Congestion Event Hours (Real Time against Day Ahead): January through September 2010 and 2011 (See 2010 SOM, Table 7-8)

	Congestion Event Hours					
	2011 (Jan - Sep)			2010 (Jan - Sep)		
Type	Real Time Constrained	Corresponding Day Ahead Constrained	Percent	Real Time Constrained	Corresponding Day Ahead Constrained	Percent
Flowgate	4,251	1,638	38.5%	1,668	458	27.5%
Interface	1,607	1,020	63.5%	2,020	1,333	66.0%
Line	7,332	2,090	28.5%	11,109	3,837	34.5%
Other	145	2	1.4%	0	0	0.0%
Transformer	3,278	1,445	44.1%	2,443	875	35.8%
Total	16,613	6,195	37.3%	17,240	6,503	37.7%

Table 7-9 Congestion summary (By facility voltage): January through September 2011 (See 2010 SOM, Table 7-9)

	Congestion Costs (Millions)										
	Day Ahead				Balancing					Event Hours	
Voltage (kV)	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
765	$2.1	($6.9)	$2.0	$11.0	$2.0	$1.3	($2.4)	($1.7)	$9.3	854	139
500	$209.5	($300.2)	($8.6)	$501.2	$29.2	$34.8	($6.8)	($12.4)	$488.7	14,917	3,332
345	$13.9	($105.8)	$11.2	$130.8	$5.5	$18.1	($60.6)	($73.2)	$57.7	17,301	3,080
230	$53.6	($96.5)	$11.6	$161.7	$13.5	$15.8	($30.6)	($32.9)	$128.8	17,287	2,633
161	$0.0	$0.0	$0.0	$0.0	($0.0)	($0.0)	($0.3)	($0.4)	($0.4)	0	29
138	$66.3	($98.0)	$21.7	$186.0	$2.0	$16.0	($43.8)	($57.8)	$128.2	37,991	6,126
115	$9.2	($14.1)	$3.0	$26.4	$0.2	$5.3	($1.1)	($6.2)	$20.2	7,826	739
69	$13.6	($0.9)	($0.2)	$14.4	($1.9)	$2.1	$0.1	($4.0)	$10.4	6,614	530
34	$0.0	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	2	5
14	$0.0	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	7	0
12	($0.0)	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	17	0
Unclassified	$1.6	($1.1)	$5.0	$7.7	$0.8	$0.2	($4.9)	($4.3)	$3.4	NA	NA
Total	$369.8	($623.6)	$45.8	$1,039.2	$51.3	$93.6	($150.5)	($192.9)	$846.4	102,816	16,613

Table 7-10 Congestion summary (By facility voltage): January through September 2010 (See 2010 SOM, Table 7-10)

	Congestion Costs (Millions)										
	Day Ahead				Balancing					Event Hours	
Voltage (kV)	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
765	$1.2	($4.5)	$1.0	$6.8	($1.1)	$0.7	($5.1)	($6.9)	($0.2)	431	250
500	$139.6	($585.3)	$13.0	$737.9	$14.6	$6.5	($25.5)	($17.5)	$720.5	13,066	4,653
345	($5.9)	($110.8)	$19.4	$124.4	($7.2)	$8.8	($54.5)	($70.5)	$53.8	8,735	2,461
230	$41.9	($120.4)	$18.4	$180.7	$0.7	$16.4	($17.9)	($33.6)	$147.1	14,893	2,822
138	$84.3	($100.6)	$12.2	$197.1	($11.6)	$4.7	($14.0)	($30.4)	$166.7	27,292	5,307
115	$30.5	($6.0)	$0.5	$37.1	$0.1	$3.5	($1.0)	($4.4)	$32.6	5,080	1,185
69	$14.9	$3.1	$0.3	$12.1	($5.6)	$0.7	($0.4)	($6.6)	$5.5	5,904	543
35	($0.0)	($0.0)	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0	0
34	($0.0)	($0.0)	$0.0	$0.0	$0.1	$0.0	$0.0	$0.1	$0.1	37	19
14	$0.0	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	21	0
13	$0.0	($0.0)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	1	0
12	$0.3	$0.2	($0.0)	$0.1	$0.0	$0.0	$0.0	$0.0	$0.1	323	0
Unclassified	$4.3	($3.1)	$4.7	$12.2	$0.0	$0.0	$0.0	$0.0	$12.2	NA	NA
Total	$311.2	($927.5)	$69.5	$1,308.3	($10.1)	$41.3	($118.4)	($169.8)	$1,138.5	75,783	17,240

Constraint Duration

Table 7-11 Top 25 constraints with frequent occurrence: January through September 2010 to 2011 (See 2010 SOM, Table 7-11)

			Event Hours						Percent of Annual Hours					
			Day Ahead			Real Time			Day Ahead			Real Time		
No.	Constraint	Type	2010	2011	Change	2010	2011	Change	2010	2011	Change	2010	2011	Change
1	South Mahwah - Waldwick	Line	0	4,651	4,651	8	473	465	0%	53%	53%	0%	5%	5%
2	Belmont	Transformer	1,057	3,862	2,805	109	497	388	12%	44%	32%	1%	6%	4%
3	AP South	Interface	3,512	3,341	(171)	1,251	870	(381)	40%	38%	(2%)	14%	10%	(4%)
4	Crete - St Johns Tap	Flowgate	800	2,763	1,963	245	640	395	9%	32%	22%	3%	7%	5%
5	Danville - East Danville	Line	148	3,305	3,157	0	0	0	2%	38%	36%	0%	0%	0%
6	Michigan City - Laporte	Flowgate	0	2,323	2,323	36	571	535	0%	27%	27%	0%	7%	6%
7	Cox's Corner - Marlton	Line	13	2,620	2,607	0	0	0	0%	30%	30%	0%	0%	0%
8	Electric Jct - Nelson	Line	1,454	2,314	860	236	158	(78)	17%	26%	10%	3%	2%	(1%)
9	Wolfcreek	Transformer	209	2,148	1,939	0	226	226	2%	25%	22%	0%	3%	3%
10	Fairview	Transformer	46	2,262	2,216	0	0	0	1%	26%	25%	0%	0%	0%
11	Wylie Ridge	Transformer	504	1,882	1,378	368	357	(11)	6%	21%	16%	4%	4%	(0%)
12	Brues - West Bellaire	Line	0	1,537	1,537	78	485	407	0%	18%	18%	1%	6%	5%
13	Pinehill - Stratford	Line	1,138	1,898	760	0	0	0	13%	22%	9%	0%	0%	0%
14	Linden - VFT	Line	95	1,828	1,733	0	0	0	1%	21%	20%	0%	0%	0%
15	Bunsonville - Eugene	Flowgate	31	1,802	1,771	0	0	0	0%	21%	20%	0%	0%	0%
16	East Frankfort - Crete	Line	2,242	1,425	(817)	801	315	(486)	26%	16%	(9%)	9%	4%	(6%)
17	Oak Grove - Galesburg	Flowgate	61	1,098	1,037	116	622	506	1%	13%	12%	1%	7%	6%
18	Clover	Transformer	464	1,193	729	243	460	217	5%	14%	8%	3%	5%	2%
19	Emilie - Falls	Line	8	1,625	1,617	24	11	(13)	0%	19%	18%	0%	0%	(0%)
20	AEP-DOM	Interface	471	1,285	814	89	172	83	5%	15%	9%	1%	2%	1%
21	Waukegan - Zion	Line	13	1,377	1,364	0	4	4	0%	16%	16%	0%	0%	0%
22	Pleasant Valley - Belvidere	Line	1,775	991	(784)	355	315	(40)	20%	11%	(9%)	4%	4%	(0%)
23	Redoak - Sayreville	Line	795	1,276	481	57	11	(46)	9%	15%	5%	1%	0%	(1%)
24	Conesville Prep - Conesville	Line	171	1,271	1,100	0	0	0	2%	15%	13%	0%	0%	0%
25	Athenia - Saddlebrook	Line	2,947	1,148	(1,799)	331	4	(327)	34%	13%	(21%)	4%	0%	(4%)

Table 7-12 Top 25 constraints with largest year-to-year change in occurrence: January through September 2010 to 2011 (See 2010 SOM, Table 7-12)

			Event Hours						Percent of Annual Hours					
			Day Ahead			Real Time			Day Ahead			Real Time		
No.	Constraint	Type	2010	2011	Change	2010	2011	Change	2010	2011	Change	2010	2011	Change
1	South Mahwah - Waldwick	Line	0	4,651	4,651	8	473	465	0%	53%	53%	0%	5%	5%
2	Belmont	Transformer	1,057	3,862	2,805	109	497	388	12%	44%	32%	1%	6%	4%
3	Danville - East Danville	Line	148	3,305	3,157	0	0	0	2%	38%	36%	0%	0%	0%
4	Michigan City - Laporte	Flowgate	0	2,323	2,323	36	571	535	0%	27%	27%	0%	7%	6%
5	Waterman - West Dekalb	Line	2,543	0	(2,543)	288	0	(288)	29%	0%	(29%)	3%	0%	(3%)
6	Cox's Corner - Marlton	Line	13	2,620	2,607	0	0	0	0%	30%	30%	0%	0%	0%
7	Crete - St Johns Tap	Flowgate	800	2,763	1,963	245	640	395	9%	32%	22%	3%	7%	5%
8	Fairview	Transformer	46	2,262	2,216	0	0	0	1%	26%	25%	0%	0%	0%
9	Wolfcreek	Transformer	209	2,148	1,939	0	226	226	2%	25%	22%	0%	3%	3%
10	Athenia - Saddlebrook	Line	2,947	1,148	(1,799)	331	4	(327)	34%	13%	(21%)	4%	0%	(4%)
11	Tiltonsville - Windsor	Line	2,391	736	(1,655)	410	70	(340)	27%	8%	(19%)	5%	1%	(4%)
12	Brues - West Bellaire	Line	0	1,537	1,537	78	485	407	0%	18%	18%	1%	6%	5%
13	Bunsonville - Eugene	Flowgate	31	1,802	1,771	0	0	0	0%	21%	20%	0%	0%	0%
14	Linden - VFT	Line	95	1,828	1,733	0	0	0	1%	21%	20%	0%	0%	0%
15	Emilie - Falls	Line	8	1,625	1,617	24	11	(13)	0%	19%	18%	0%	0%	(0%)
16	Doubs	Transformer	1,230	51	(1,179)	423	51	(372)	14%	1%	(13%)	5%	1%	(4%)
17	Oak Grove - Galesburg	Flowgate	61	1,098	1,037	116	622	506	1%	13%	12%	1%	7%	6%
18	Waukegan - Zion	Line	13	1,377	1,364	0	4	4	0%	16%	16%	0%	0%	0%
19	Wylie Ridge	Transformer	504	1,882	1,378	368	357	(11)	6%	21%	16%	4%	4%	(0%)
20	East Frankfort - Crete	Line	2,242	1,425	(817)	801	315	(486)	26%	16%	(9%)	9%	4%	(6%)
21	Bedington - Black Oak	Interface	1,819	624	(1,195)	47	7	(40)	21%	7%	(14%)	1%	0%	(0%)
22	Danville - East Danville	Line	1,307	0	(1,307)	138	321	183	15%	0%	(15%)	2%	4%	2%
23	Branchburg - Readington	Line	1,210	246	(964)	184	40	(144)	14%	3%	(11%)	2%	0%	(2%)
24	Conesville Prep - Conesville	Line	171	1,271	1,100	0	0	0	2%	15%	13%	0%	0%	0%
25	Mount Storm - Pruntytown	Line	571	29	(542)	574	38	(536)	7%	0%	(6%)	7%	0%	(6%)

Constraint Costs

Table 7-13 Top 25 constraints affecting annual PJM congestion costs (By facility): January through September 2011 (See 2010 SOM, Table 7-13)

				Congestion Costs (Millions)									Percent of Total PJM Congestion Costs
				Day Ahead				Balancing					
No.	Constraint	Type	Location	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	2011 (Jan - Sep)
1	AP South	Interface	500	($8.0)	($220.5)	($1.9)	$210.6	$13.0	$11.9	$4.1	$5.1	$215.7	25%
2	5004/5005 Interface	Interface	500	$58.1	($12.8)	($4.7)	$66.2	$13.5	$16.2	$7.8	$5.1	$71.3	8%
3	Belmont	Transformer	AP	$30.1	($26.3)	($2.2)	$54.3	($3.2)	($2.9)	($1.6)	($1.9)	$52.4	6%
4	West	Interface	500	$66.9	$11.1	($5.3)	$50.5	$0.2	$0.0	$0.1	$0.3	$50.7	6%
5	AEP-DOM	Interface	500	$2.8	($28.6)	$1.9	$33.3	$1.6	$1.1	($0.4)	$0.0	$33.4	4%
6	Electric Jct - Nelson	Line	ComEd	($2.2)	($32.9)	$6.9	$37.7	$0.2	$3.5	($7.7)	($11.0)	$26.7	3%
7	Bedington - Black Oak	Interface	500	$5.4	($19.5)	($2.0)	$22.9	$0.1	$0.0	$0.1	$0.2	$23.1	3%
8	Crete - St Johns Tap	Flowgate	MISO	$1.2	($24.9)	($3.9)	$22.2	$4.7	$3.7	($2.4)	($1.4)	$20.8	2%
9	Clover	Transformer	Dominion	$3.4	($17.5)	$4.6	$25.5	$1.3	$2.4	($7.7)	($8.7)	$16.7	2%
10	Dickerson - Quince Orchard	Line	Pepco	$19.2	$1.1	($1.7)	$16.5	$3.1	$6.3	$2.7	($0.6)	$15.9	2%
11	East	Interface	500	$11.0	($5.5)	($1.1)	$15.4	$0.1	$1.2	$0.1	($1.0)	$14.4	2%
12	Susquehanna	Transformer	PPL	$6.1	($8.4)	($0.1)	$14.4	$0.0	$0.0	$0.0	$0.0	$14.4	2%
13	East Frankfort - Crete	Line	ComEd	($0.3)	($13.9)	($1.3)	$12.3	$0.5	$0.4	($1.1)	($1.0)	$11.3	1%
14	Wylie Ridge	Transformer	AP	$36.1	$25.3	$1.8	$12.5	$2.0	$0.9	($2.5)	($1.4)	$11.1	1%
15	Brues - West Bellaire	Line	AEP	$15.1	$0.5	$0.7	$15.3	($1.9)	$1.7	($1.3)	($4.9)	$10.4	1%
16	Waldwick	Transformer	PSEG	$0.7	($1.0)	$2.1	$3.7	($0.1)	$1.2	($12.5)	($13.8)	($10.0)	(1%)
17	Plymouth Meeting - Whitpain	Line	PECO	$3.6	($6.0)	($0.0)	$9.6	$0.1	$0.2	($0.1)	($0.2)	$9.4	1%
18	Cloverdale	Transformer	AEP	$2.0	($5.5)	$1.6	$9.2	$0.3	$0.3	($0.1)	($0.1)	$9.1	1%
19	Oak Grove - Galesburg	Flowgate	MISO	($2.6)	($7.2)	$4.4	$9.0	($1.0)	$3.4	($12.7)	($17.1)	($8.1)	(1%)
20	Bunsonville - Eugene	Flowgate	MISO	($1.6)	($8.2)	$1.4	$8.0	$0.0	$0.0	$0.0	$0.0	$8.0	1%
21	Pleasant Valley - Belvidere	Line	ComEd	($2.5)	($13.1)	$1.7	$12.3	($0.5)	$2.2	($3.1)	($5.7)	$6.5	1%
22	Cloverdale - Lexington	Line	AEP	$4.1	($3.5)	$1.3	$8.8	$2.4	$1.3	($3.8)	($2.7)	$6.2	1%
23	South Mahwah - Waldwick	Line	PSEG	$9.8	($11.6)	($1.3)	$20.2	($0.5)	$5.4	($20.1)	($26.0)	($5.8)	(1%)
24	Lakeview - Pleasant Prairie	Flowgate	MISO	($0.0)	($0.1)	$0.2	$0.3	($0.2)	($0.1)	($5.6)	($5.8)	($5.5)	(1%)
25	Yukon	Transformer	AP	($0.3)	($5.1)	($0.1)	$4.7	$1.4	$0.6	($0.1)	$0.7	$5.4	1%

Table 7-14 Top 25 constraints affecting annual PJM congestion costs (By facility): January through September 2010 (See 2010 SOM, Table 7-14)

				Congestion Costs (Millions)									Percent of Total PJM Congestion Costs
				Day Ahead				Balancing					
No.	Constraint	Type	Location	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	2010 (Jan - Sep)
1	AP South	Interface	500	($11.5)	($351.3)	$1.6	$341.3	$8.5	$5.9	($1.8)	$0.8	$342.1	30%
2	Bedington - Black Oak	Interface	500	$6.3	($76.5)	$2.2	$85.0	$0.1	($0.9)	($0.5)	$0.5	$85.5	8%
3	5004/5005 Interface	Interface	500	$40.9	($34.7)	($0.0)	$75.7	$9.4	$8.3	($1.2)	($0.1)	$75.5	7%
4	Doubs	Transformer	AP	$36.0	($29.7)	$0.4	$66.2	$1.0	$2.1	($2.4)	($3.5)	$62.7	6%
5	AEP-DOM	Interface	500	$9.4	($37.9)	$0.9	$48.3	$0.1	($1.3)	($0.1)	$1.3	$49.6	4%
6	Cloverdale - Lexington	Line	AEP	$15.9	($13.9)	$2.8	$32.7	($2.9)	($3.3)	($5.0)	($4.6)	$28.1	2%
7	East Frankfort - Crete	Line	ComEd	$4.5	($28.8)	$3.9	$37.2	($4.0)	$0.4	($6.6)	($10.9)	$26.3	2%
8	Brandon Shores - Riverside	Line	BGE	$16.8	($10.5)	($0.4)	$26.8	$0.8	$2.3	$0.4	($1.2)	$25.7	2%
9	Mount Storm - Pruntytown	Line	AP	$1.3	($21.2)	$2.1	$24.7	($0.2)	($5.2)	($4.8)	$0.2	$24.9	2%
10	West	Interface	500	$20.8	($1.7)	($0.2)	$22.3	$0.6	$1.2	$0.1	($0.5)	$21.8	2%
11	Tiltonsville - Windsor	Line	AP	$17.6	($2.4)	$1.0	$21.0	($3.3)	$0.5	($0.3)	($4.1)	$16.9	1%
12	Brunner Island - Yorkana	Line	Met-Ed	($2.5)	($15.0)	$0.4	$12.9	$0.8	($1.1)	($0.8)	$1.0	$13.8	1%
13	Belmont	Transformer	AP	$7.1	($6.0)	($0.8)	$12.3	($0.1)	($0.4)	($0.1)	$0.2	$12.4	1%
14	Unclassified	Unclassified	Unclassified	$4.3	($3.1)	$4.7	$12.2	$0.0	$0.0	$0.0	$0.0	$12.2	1%
15	Crescent	Transformer	DLCO	$7.5	($3.9)	$0.6	$12.0	$0.2	($0.6)	($0.6)	$0.2	$12.2	1%
16	Crete - St Johns Tap	Flowgate	MISO	($1.4)	($15.8)	($0.2)	$14.2	($1.0)	($0.2)	($1.7)	($2.5)	$11.7	1%
17	Electric Jct - Nelson	Line	ComEd	($9.0)	($33.8)	$7.0	$31.8	($0.3)	$3.6	($16.2)	($20.1)	$11.7	1%
18	Branchburg - Readington	Line	PSEG	$5.7	($7.2)	$0.6	$13.6	($0.5)	$1.6	$0.1	($1.9)	$11.7	1%
19	Clover	Transformer	Dominion	$3.1	($9.9)	$1.8	$14.8	($1.2)	($0.8)	($2.9)	($3.4)	$11.5	1%
20	Pleasant Valley - Belvidere	Line	ComEd	($6.8)	($20.7)	$1.9	$15.8	$0.1	$2.7	($3.6)	($6.1)	$9.7	1%
21	Eddystone - Island Road	Line	PECO	$0.7	($7.7)	$1.1	$9.6	($0.0)	$0.0	$0.0	($0.0)	$9.5	1%
22	Millville - Sleepy Hollow	Line	Dominion	$6.7	($1.9)	($0.1)	$8.5	$0.0	$0.0	$0.0	$0.0	$8.5	1%
23	Hunterstown	Transformer	Met-Ed	$4.2	($3.9)	$0.3	$8.4	$0.1	$0.0	($0.0)	$0.0	$8.5	1%
24	Pleasant Prairie - Zion	Flowgate	MISO	($3.1)	($7.5)	$2.4	$6.7	($0.4)	$1.2	($13.3)	($14.9)	($8.2)	(1%)
25	Limerick	Transformer	PECO	$1.4	($2.0)	($0.1)	$3.2	$0.8	($3.4)	($0.1)	$4.1	$7.3	1%

Table 7-15 Congestion cost by the type of the participant: January through September 2011 (New table)

	Congestion Costs (Millions)								
	Day Ahead				Balancing				
Participant Type	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total
Financial	$57.9	$9.1	$52.3	$101.1	($33.8)	$5.3	($141.6)	($180.6)	($79.5)
Physical	$311.9	($632.7)	($6.5)	$938.1	$85.0	$88.3	($9.0)	($12.3)	$925.9
Total	$369.8	($623.6)	$45.8	$1,039.2	$51.3	$93.6	($150.5)	($192.9)	$846.4

Table 7-16 Congestion cost by the type of the participant: January through September 2010 (New table)

	Congestion Costs (Millions)								
	Day Ahead				Balancing				
Participant Type	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total
Financial	$24.6	$4.2	$61.6	$82.0	($54.2)	$16.7	($112.6)	($183.5)	($101.6)
Physical	$286.6	($931.8)	$7.9	$1,226.3	$44.2	$24.7	($5.8)	$13.7	$1,240.0
Total	$311.2	($927.5)	$69.5	$1,308.3	($10.1)	$41.3	($118.4)	($169.8)	$1,138.5

Congestion-Event Summary for MISO Flowgates

Table 7-17 Top congestion cost impacts from MISO flowgates affecting PJM dispatch (By facility): January through September 2011 (See 2010 SOM, Table 7-15)

		Congestion Costs (Millions)										
		Day Ahead				Balancing					Event Hours	
No.	Constraint	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
1	Crete - St Johns Tap	$1.2	($24.9)	($3.9)	$22.2	$4.7	$3.7	($2.4)	($1.4)	$20.8	2,763	622
2	Oak Grove - Galesburg	($2.6)	($7.2)	$4.4	$9.0	($1.0)	$3.4	($12.7)	($17.1)	($8.1)	1,098	622
3	Bunsonville - Eugene	($1.6)	($8.2)	$1.4	$8.0	$0.0	$0.0	$0.0	$0.0	$8.0	1,802	0
4	Lakeview - Pleasant Prairie	($0.0)	($0.1)	$0.2	$0.3	($0.2)	($0.1)	($5.6)	($5.8)	($5.5)	24	294
5	Kenosha - Lakeview	$0.0	$0.0	$0.0	$0.0	($0.2)	($0.5)	($4.9)	($4.7)	($4.7)	0	349
6	Michigan City - Laporte	$0.9	($5.1)	$2.3	$8.3	($1.3)	($1.1)	($3.6)	($3.8)	$4.5	2,323	571
7	Pleasant Prairie - Zion	($0.8)	($1.9)	$2.0	$3.1	($0.0)	($0.4)	($7.9)	($7.5)	($4.4)	839	210
8	Kenosha - Lakeview	$1.3	($1.3)	$0.9	$3.5	$0.0	$0.0	$0.0	$0.0	$3.5	989	0
9	Cook - Palisades	$0.9	($2.3)	$0.2	$3.5	$0.0	$0.0	($0.2)	($0.2)	$3.2	419	9
10	Benton Harbor - Palisades	$0.7	($0.1)	$0.2	$1.0	$1.0	$1.0	($2.9)	($2.9)	($1.9)	67	120
11	Nucor - Whitestown	$0.0	$0.0	$0.0	$0.0	$0.1	$0.3	($1.6)	($1.8)	($1.8)	0	49
12	Eugene - Bunsonville	$0.0	$0.0	$0.0	$0.0	($0.0)	$0.0	($1.7)	($1.7)	($1.7)	0	76
13	Rising	($1.0)	($4.2)	($0.2)	$3.0	($0.3)	$0.7	($3.3)	($4.4)	($1.3)	947	172
14	Rantoul Jct - Sidney	($0.3)	($1.3)	$0.1	$1.1	$0.5	($0.0)	($0.3)	$0.2	$1.3	62	113
15	Rantoul - Rantoul Jct	($0.2)	($1.6)	$0.3	$1.6	$0.0	$0.0	($0.4)	($0.4)	$1.2	313	139
16	Burr Oak	$0.4	($0.7)	$0.0	$1.1	$0.3	($0.1)	($0.4)	($0.1)	$1.1	147	27
17	Pierce - Foster	$0.0	$0.0	$0.0	$0.0	$0.5	$0.3	($1.2)	($1.0)	($1.0)	0	16
18	Babcock - Stillwell	($0.8)	($1.6)	($0.2)	$0.7	$0.0	$0.0	$0.0	$0.0	$0.7	295	0
19	Breed - Wheatland	$0.0	$0.0	$0.0	$0.0	$0.1	$0.1	($0.7)	($0.6)	($0.6)	0	13
20	Cumberland - Bush	($0.1)	($2.5)	$0.8	$3.1	$0.2	$0.2	($2.5)	($2.5)	$0.6	936	0

Table 7-18 Top congestion cost impacts from MISO flowgates affecting PJM dispatch (By facility): January through September 2010 (See 2010 SOM, Table 7-16)

		Congestion Costs (Millions)										
		Day Ahead				Balancing					Event Hours	
No.	Constraint	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
1	Crete - St Johns Tap	($1.4)	($15.8)	($0.2)	$14.2	($1.0)	($0.2)	($1.7)	($2.5)	$11.7	800	245
2	Pleasant Prairie - Zion	($3.1)	($7.5)	$2.4	$6.7	($0.4)	$1.2	($13.3)	($14.9)	($8.2)	1,098	306
3	Rising	$0.3	($4.2)	$0.6	$5.1	($0.0)	$0.0	($0.2)	($0.3)	$4.8	776	44
4	Palisades - Vergennes	$2.8	($0.6)	$0.5	$3.9	($0.1)	$0.5	($1.0)	($1.5)	$2.3	235	91
5	Dunes Acres - Michigan City	$0.6	($1.1)	$0.4	$2.1	($0.0)	($0.0)	($0.0)	($0.0)	$2.1	142	3
6	State Line - Wolf Lake	$0.3	($0.6)	$0.6	$1.5	($0.0)	($0.0)	($0.0)	($0.0)	$1.5	376	1
7	Marktown - Inland Steel	$0.6	($1.0)	$0.7	$2.2	($0.9)	$0.8	($1.4)	($3.1)	($0.9)	424	344
8	Breed - Wheatland	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	($0.7)	($0.7)	($0.7)	0	24
9	Benton Harbor - Palisades	$0.0	$0.0	$0.0	$0.0	($0.1)	$0.2	($0.3)	($0.6)	($0.6)	0	32
10	Beaver Valley - Sammis	$0.0	$0.0	$0.0	$0.0	($0.1)	$0.1	($0.2)	($0.4)	($0.4)	0	8
11	Oak Grove - Galesburg	($0.1)	($0.3)	$0.1	$0.3	($0.0)	$0.1	($0.6)	($0.7)	($0.4)	61	116
12	Michigan City - Laporte	$0.0	$0.0	$0.0	$0.0	($0.1)	$0.0	($0.3)	($0.4)	($0.4)	0	36
13	Burr Oak	$0.1	($0.2)	$0.0	$0.3	$0.0	$0.2	($0.5)	($0.6)	($0.4)	76	103
14	Nucor - Whitestown	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	($0.4)	($0.4)	($0.4)	0	21
15	Cook - Palisades	$0.0	$0.0	$0.0	$0.0	($0.2)	($0.0)	($0.2)	($0.4)	($0.4)	0	9
16	Lanesville	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	($0.3)	($0.4)	($0.4)	0	38
17	Stillwell - Dumont	$0.0	($0.2)	$0.1	$0.3	$0.0	$0.0	$0.0	$0.0	$0.3	42	0
18	Bunsonville - Eugene	($0.0)	($0.3)	$0.1	$0.3	$0.0	$0.0	$0.0	$0.0	$0.3	31	0
19	Palisades - Roosevelt	$0.0	$0.0	$0.0	$0.0	($0.0)	$0.1	($0.2)	($0.3)	($0.3)	0	30
20	Cumberland - Bush	$0.0	$0.0	$0.0	$0.0	($0.0)	($0.0)	($0.2)	($0.2)	($0.2)	0	18

Congestion-Event Summary for the 500 kV System

Table 7-19 Regional constraints summary (By facility): January through September 2011 (See 2010 SOM, Table 7-17)

				Congestion Costs (Millions)										
				Day Ahead				Balancing					Event Hours	
No.	Constraint	Type	Location	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
1	AP South	Interface	500	($8.0)	($220.5)	($1.9)	$210.6	$13.0	$11.9	$4.1	$5.1	$215.7	3,341	439
2	5004/5005 Interface	Interface	500	$58.1	($12.8)	($4.7)	$66.2	$13.5	$16.2	$7.8	$5.1	$71.3	684	439
3	West	Interface	500	$66.9	$11.1	($5.3)	$50.5	$0.2	$0.0	$0.1	$0.3	$50.7	798	19
4	AEP-DOM	Interface	500	$2.8	($28.6)	$1.9	$33.3	$1.6	$1.1	($0.4)	$0.0	$33.4	1,285	172
5	Bedington - Black Oak	Interface	500	$5.4	($19.5)	($2.0)	$22.9	$0.1	$0.0	$0.1	$0.2	$23.1	624	7
6	East	Interface	500	$11.0	($5.5)	($1.1)	$15.4	$0.1	$1.2	$0.1	($1.0)	$14.4	295	22
7	Central	Interface	500	$1.5	$0.4	($0.1)	$1.1	$0.0	$0.0	$0.0	$0.0	$1.1	64	0
8	Doubs - Mount Storm	Line	500	$0.1	($0.2)	($0.0)	$0.2	($0.0)	($0.0)	($0.0)	($0.0)	$0.2	9	4
9	Harrison - Pruntytown	Line	500	$0.1	($0.0)	$0.0	$0.1	($0.0)	($0.0)	$0.0	$0.0	$0.1	10	4
10	Dominion East	Interface	500	$0.0	$0.0	$0.0	$0.0	$0.0	($0.2)	($0.2)	$0.0	$0.0	0	38
11	Conemaugh - Hunterstown	Line	500	$0.0	$0.0	$0.0	$0.0	($0.0)	$0.0	$0.0	($0.0)	($0.0)	0	9

Table 7-20 Regional constraints summary (By facility): January through September 2010 (See 2010 SOM, Table 7-18)

				Congestion Costs (Millions)										
				Day Ahead				Balancing					Event Hours	
No.	Constraint	Type	Location	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total	Day Ahead	Real Time
1	AP South	Interface	500	($11.5)	($351.3)	$1.6	$341.3	$8.5	$5.9	($1.8)	$0.8	$342.1	3,512	1,251
2	Bedington - Black Oak	Interface	500	$6.3	($76.5)	$2.2	$85.0	$0.1	($0.9)	($0.5)	$0.5	$85.5	1,819	47
3	5004/5005 Interface	Interface	500	$40.9	($34.7)	($0.0)	$75.7	$9.4	$8.3	($1.2)	($0.1)	$75.5	1,379	561
4	AEP-DOM	Interface	500	$9.4	($37.9)	$0.9	$48.3	$0.1	($1.3)	($0.1)	$1.3	$49.6	471	89
5	West	Interface	500	$20.8	($1.7)	($0.2)	$22.3	$0.6	$1.2	$0.1	($0.5)	$21.8	161	58
6	Harrison - Pruntytown	Line	500	$1.9	($4.1)	$0.8	$6.9	($0.5)	($0.3)	($2.7)	($2.9)	$4.0	231	223
7	East	Interface	500	$1.4	($1.8)	$0.0	$3.2	($0.0)	$0.0	$0.0	($0.0)	$3.2	154	1
8	Central	Interface	500	$1.1	($0.2)	$0.1	$1.4	$0.1	$0.1	($0.1)	($0.0)	$1.3	116	13
9	Doubs - Mount Storm	Line	500	$0.0	$0.0	$0.0	$0.0	$0.5	$0.7	($0.1)	($0.3)	($0.3)	0	45
10	Harrison Tap - North Longview	Line	500	$0.1	($0.0)	$0.0	$0.1	$0.0	$0.0	$0.0	$0.0	$0.1	6	0
11	Juniata - Keystone	Line	500	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	0	1

Zonal Congestion

Summary

Table 7-21 Congestion cost summary (By control zone): January through September 2011 (See 2010 SOM, Table 7-19)

	Congestion Costs (Millions)								
	Day Ahead				Balancing				
Control Zone	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total
AECO	$41.4	$12.6	$0.7	$29.5	($0.2)	$0.1	($1.0)	($1.3)	$28.1
AEP	($52.3)	($249.0)	$12.2	$208.9	$2.2	$27.0	($20.8)	($45.6)	$163.3
AP	$0.3	($135.6)	($3.8)	$132.1	$4.0	$5.2	($0.7)	($1.9)	$130.1
ATSI	($47.2)	($25.1)	$1.5	($20.7)	($1.8)	$7.3	($4.2)	($13.3)	($34.0)
BGE	$113.4	$67.5	$6.7	$52.5	$3.1	$0.9	($10.3)	($8.2)	$44.4
ComEd	($337.3)	($533.6)	$1.0	$197.3	$40.5	$27.2	($22.8)	($9.5)	$187.8
DAY	($13.7)	($22.6)	$0.7	$9.6	$2.2	$5.0	($3.5)	($6.3)	$3.3
DLCO	($36.5)	($57.9)	($0.2)	$21.2	($3.0)	$0.4	($0.5)	($4.0)	$17.2
DPL	$60.0	$19.9	$1.2	$41.3	$0.5	$3.6	($2.1)	($5.2)	$36.1
Dominion	$100.8	($45.1)	$20.4	$166.3	($7.9)	$1.7	($34.5)	($44.1)	$122.1
External	($36.3)	($36.2)	($10.7)	($10.9)	($3.4)	($15.6)	($7.3)	$4.9	($6.0)
JCPL	$66.1	$25.8	$0.5	$40.8	$4.2	$1.2	($0.8)	$2.2	$43.0
Met-Ed	$37.0	$43.8	$0.4	($6.4)	$2.1	$0.6	($0.7)	$0.9	($5.5)
PECO	$125.7	$114.9	$0.9	$11.7	$0.4	$4.7	($1.1)	($5.4)	$6.3
PENELEC	($21.1)	($78.5)	($0.5)	$56.9	$2.7	$6.0	($0.9)	($4.2)	$52.7
PPL	$105.5	$111.1	$4.8	($0.8)	$8.0	$2.4	($3.3)	$2.2	$1.4
PSEG	$120.1	$87.2	$5.5	$38.4	$1.0	$16.7	($30.3)	($46.0)	($7.6)
Pepco	$141.9	$77.3	$4.6	$69.2	($3.3)	($1.9)	($5.6)	($6.9)	$62.3
RECO	$2.1	($0.2)	$0.1	$2.4	$0.0	$1.0	($0.1)	($1.1)	$1.3
Total	$369.8	($623.6)	$45.8	$1,039.2	$51.3	$93.6	($150.5)	($192.9)	$846.4

Table 7-22 Congestion cost summary (By control zone): January through September 2010 (See 2010 SOM, Table 7-20)

	Congestion Costs (Millions)								
	Day Ahead				Balancing				
Control Zone	Load Payments	Generation Credits	Explicit	Total	Load Payments	Generation Credits	Explicit	Total	Grand Total
AECO	$33.6	$12.0	$0.2	$21.8	($0.7)	($1.0)	($0.1)	$0.2	$22.0
AEP	($122.2)	($278.3)	$12.0	$168.1	($9.8)	$20.5	($16.5)	($46.9)	$121.3
AP	($4.0)	($241.6)	$1.7	$239.3	$11.3	$20.4	($3.9)	($13.0)	$226.2
BGE	$157.2	$90.2	$6.0	$73.0	$10.8	($3.6)	($7.9)	$6.5	$79.5
ComEd	($325.6)	($539.7)	$4.7	$218.7	($23.9)	$8.9	($13.9)	($46.6)	$172.1
DAY	($14.8)	($23.4)	$6.1	$14.7	$1.3	$1.2	($7.0)	($6.9)	$7.8
DLCO	($72.0)	($110.0)	($0.2)	$37.8	($9.2)	($0.6)	$0.2	($8.4)	$29.4
DPL	$57.2	$20.5	$0.7	$37.4	($0.5)	$1.1	($1.0)	($2.7)	$34.7
Dominion	$192.1	($30.6)	$12.7	$235.4	($3.8)	($6.0)	($14.5)	($12.3)	$223.1
External	($144.5)	($153.4)	($5.5)	$3.4	$7.0	($18.5)	($26.4)	($0.9)	$2.5
JCPL	$56.4	$20.2	$0.4	$36.6	$2.8	($0.2)	($0.5)	$2.5	$39.0
Met-Ed	$50.9	$37.2	$0.9	$14.6	($0.8)	($0.1)	($1.2)	($1.8)	$12.8
PECO	$48.8	$54.4	$0.3	($5.3)	($2.6)	$0.9	($0.9)	($4.3)	($9.6)
PENELEC	($61.3)	($142.2)	$0.3	$81.1	$17.4	$6.0	$0.0	$11.5	$92.6
PPL	$74.6	$84.0	$3.0	($6.3)	$9.6	$7.5	($0.6)	$1.4	($5.0)
PSEG	$97.0	$74.4	$21.4	$44.0	($2.1)	$11.8	($18.4)	($32.2)	$11.8
Pepco	$284.9	$198.7	$4.9	$91.2	($17.5)	($7.0)	($5.7)	($16.2)	$75.0
RECO	$2.9	$0.2	$0.0	$2.7	$0.6	($0.0)	($0.0)	$0.6	$3.3
Total	$311.2	($927.5)	$69.5	$1,308.3	($10.1)	$41.3	($118.4)	($169.8)	$1,138.5