



# Operating Reserves Issues

MIC

November 10, 2005

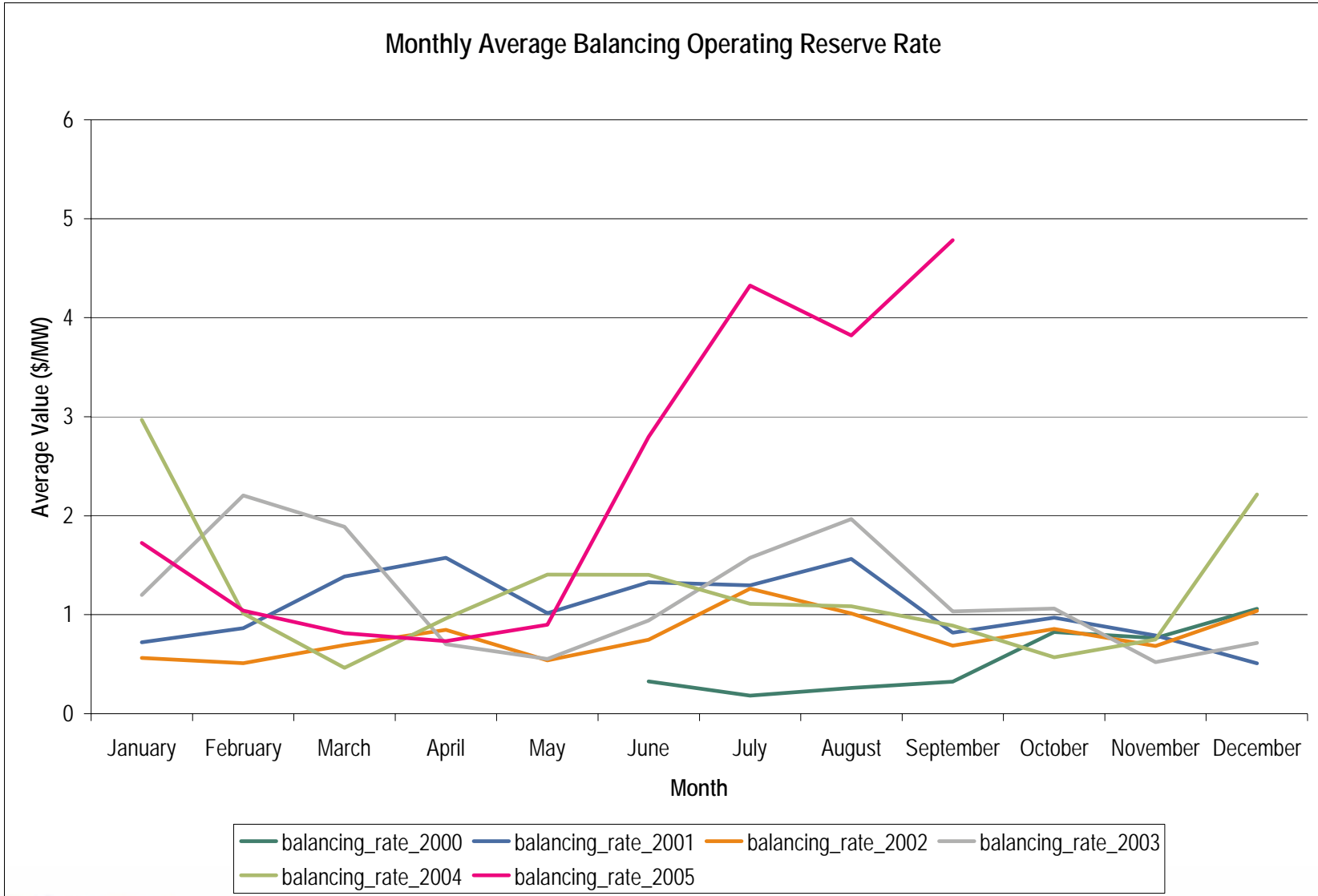
Joe Bowring

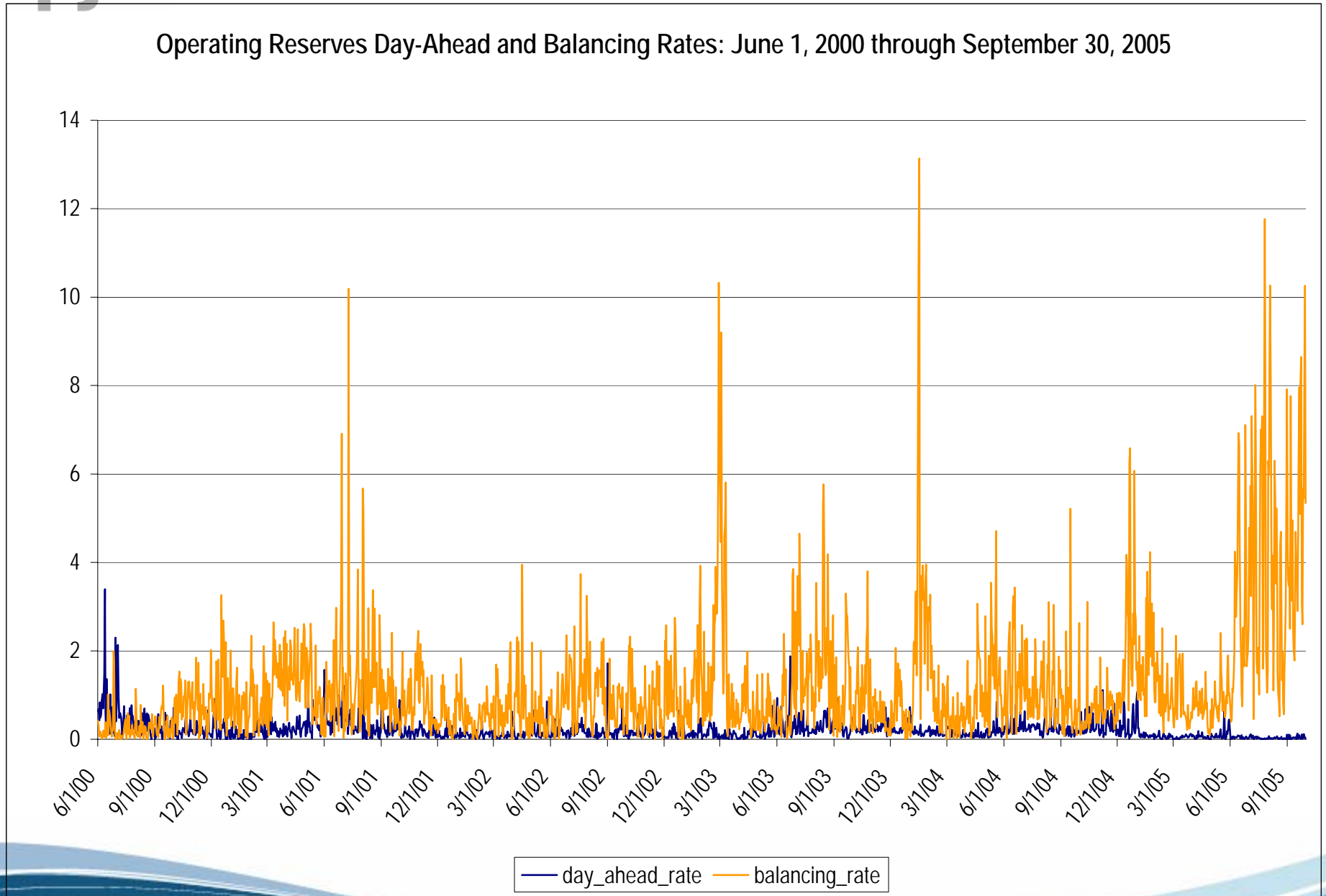
Market Monitor



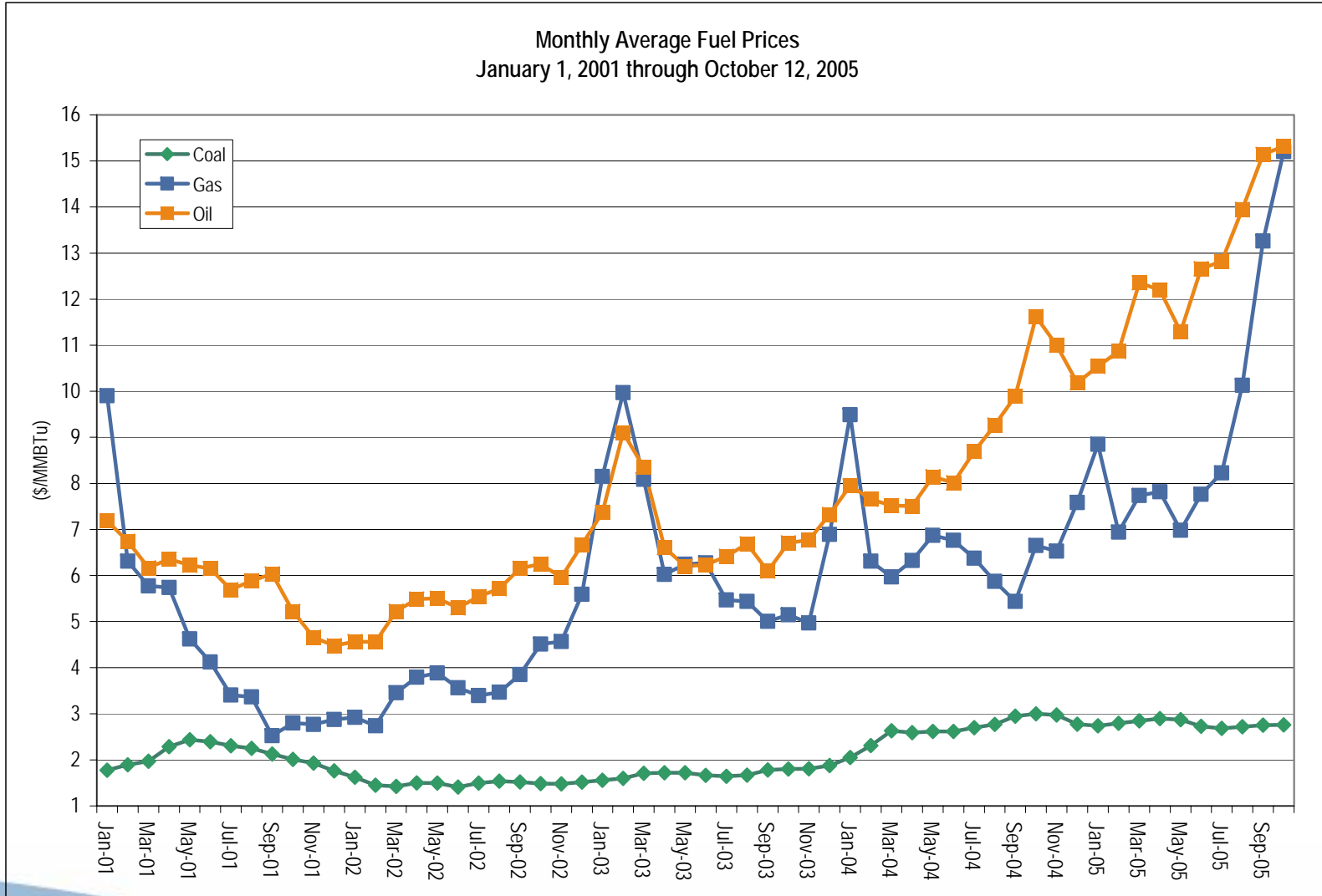
# Monthly Average Balancing Operating Reserve Rate

<b>Month</b>	<b>Operating Reserve Payments (\$)</b>	<b>Operating Reserve Payment as a percent of Total PJM Billings</b>	<b>Average Monthly Balancing Operating Reserves Rates</b>
Jan-04	52,614,260	6.57%	2.97
Feb-04	18,606,774	3.35%	1.01
Mar-04	10,900,284	2.03%	0.46
Apr-04	15,384,927	2.96%	0.96
May-04	35,060,649	4.90%	1.41
Jun-04	44,365,903	6.13%	1.40
Jul-04	39,212,548	4.36%	1.11
Aug-04	37,548,759	4.45%	1.09
Sep-04	25,549,623	3.68%	0.89
Oct-04	31,332,038	4.55%	0.57
Nov-04	35,350,526	4.56%	0.75
Dec-04	68,978,720	6.95%	2.21
Jan-05	54,710,093	4.66%	1.72
Feb-05	26,818,691	3.11%	1.04
Mar-05	20,898,196	2.02%	0.81
Apr-05	16,365,871	1.92%	0.73
May-05	23,631,407	1.94%	0.90
Jun-05	64,185,737	3.09%	2.80
Jul-05	104,565,561	3.77%	4.32
Aug-05	87,046,769	2.72%	3.82





- Operating reserve rates have increased since May
- Potential sources of high operating reserve charges:
  - Higher fuel costs
  - Increased transmission outages/maintenance
  - Unanticipated interface flows
  - Market power
  - PJM dispatch





# September 2005 Outages(230 kV and above)

<b>ZONE</b>	<b>FACILITY NAME</b>	<b>Start</b>	<b>End</b>
AE	LINE CARDIFF 230 KV CARDIFF-CEDAR	12-Sep-05	17-Sep-05
AEP	LINE BROADFO2 765 KV BROADFO2-JACKSONS	6-Sep-05	16-Sep-05
AEP	LINE CLOVERD2 765 KV CLOVERD2-JACKSONS	26-Sep-05	30-Sep-05
AEP	LINE DESOTO 345 KV DESOTO-SORENSEN	5-Sep-05	29-Sep-05
AEP	LINE DUMONT2 345 KV DUMONT2-STILLWEL	12-Sep-05	30-Sep-05
AEP	LINE HAYDEN 345 KV HAYDEN-HYATTCS	5-Sep-05	30-Sep-05
AEP	XFMR BREED 345 KV BREED T101 XFORMER	5-Sep-05	16-Sep-05
AEP	XFMR KAMMER2 345 KV KAMMER2 .100 XFORMER	1-May-05	31-Dec-05
AEP	XFMR KAMMER2 345 KV KAMMER2 .300 XFORMER	4-Feb-05	31-Dec-05
AEP	XFMR TIDD_AEP 345 KV TIDD_AEP A-P XFORMER	13-Jul-04	31-Dec-05
AEP	XFMR TRISTATE 345 KV TRISTATE 3 XFORMER	7-Aug-04	1-Jan-20
APS	LINE CABOT 500 KV CABOT-WYLIERID	26-Sep-05	30-Sep-05
APS	LINE CARROLL 230 KV CARROLL-MTAIRY	26-Sep-05	30-Sep-05
APS	LINE DOUBS 230 KV DOUBS-RD207JCT 207	12-Sep-05	23-Sep-05
APS	LINE MONOCACY 230 KV MONOCACY-RD207JCT 207	12-Sep-05	23-Sep-05
APS	LINE MONTGOME 230 KV MONTEGOME-RD207JCT 207	12-Sep-05	23-Sep-05
APS	XFMR WYLIERID 500 KV WYLIERID TRAN 7 XFORMER	19-Sep-05	23-Sep-05
BC	LINE HIGHRIDG 230 KV HIGHRIDG-HOWARD 2332-A	26-Sep-05	30-Sep-05



# September 2005 Outages(230 kV and above) continued

COMED	LINE 103 LISL 345 KV 103 LISL-108 LOCK 10802	12-Sep-05	16-Sep-05
COMED	XFMR 103 LISL 345 KV 103 LISLE 45TR84 CT	12-Sep-05	16-Sep-05
COMED	XFMR 22 ZION 345 KV 22 ZION 45TR1E 24	22-Sep-05	28-Apr-06
COMED	XFMR 22 ZION 345 KV 22 ZION 45TR1W 24	22-Sep-05	28-Apr-06
DAYTON	LINE SHELBY 345 KV SHELBY-MIAMI	12-Sep-05	18-Sep-05
DOM	LINE BEAUMEAD 230 KV BEAUMEAD-STERLNPK 227A	26-Sep-05	30-Sep-05
DOM	LINE BEAUMEAD 230 KV BEAUMEAD-STERLNPK 274B	26-Sep-05	30-Sep-05
DOM	LINE FOURRIVR 230 KV FOURRIVR-STJOHNS4 256	12-Sep-05	23-Sep-05
DOM	LINE GREENWCH 230 KV GREENWCH-CHESAPKE 262A	19-Sep-05	1-Dec-05
DOM	LINE LEXINGTN 500 KV LEXINGTN-BATHCO 547A	3-Sep-05	2-Oct-05
DOM	LINE LYNNHAVN 230 KV LYNNHAVN-LANDSTWN 2026A	12-Sep-05	30-Sep-05
DOM	LINE MINEROAD 230 KV MINEROAD-FOURRIVR 256A	12-Sep-05	23-Sep-05
DOM	LINE PLEASNTV 230 KV PLEASNTV-LOUDOUN4 201A	19-Sep-05	29-Sep-05
DOM	LINE PLSVALDP 230 KV BULLRUN -LOUDOUN4 295A	6-Sep-05	16-Sep-05
DOM	LINE SEPTA4 500 KV SEPTA4 -SURRY4 578A	6-Sep-05	3-Oct-05
DOM	LINE WARWICK 230 KV WARWICK -WHEALTON 292A	20-Sep-05	24-Sep-05
DOM	LINE WARWICK 230 KV WARWICK -YORKTOW4 292B	24-Sep-05	29-Sep-05
DOM	LINE YADKIN4 230 KV YADKIN4 -CHESAPKE 262B	19-Sep-05	1-Dec-05
DOM	XFMR ARLINGTN 230 KV ARLINGTN TX3 XFORMER	12-Sep-05	15-Sep-05
DOM	XFMR GAINESVL 230 KV GAINESVL TX2 XFORMER	13-Jun-05	19-May-06





# September 2005 Outages(230 kV and above) continued

DOM	XFMR GORDONSV 230 KV GORDONSV TX1	XFORMER	26-Sep-05	30-Sep-05
DOM	XFMR GORDONSV 230 KV GORDONSV TX3	XFORMER	19-Sep-05	30-Sep-05
DOM	XFMR LOUISACT 230 KV LOUISACT TG1	XFORMER	17-May-05	31-Dec-05
DOM	XFMR LOUISACT 230 KV LOUISACT TG4	XFORMER	17-May-05	31-Dec-05
DOM	XFMR WHEALTON 230 KV WHEALTON TX1	XFORMER	12-Sep-05	16-Sep-05
DPL	LINE DOVER 230 KV DOVER-MILFORD		12-Sep-05	17-Sep-05
DUQU	XFMR CARS DUQ 345 KV CARS DUQ T2	XFORMER	13-Jun-05	31-Dec-05
JC-N	LINE GILLETTE 230 KV GILLETTE-SUMM JC U1035		19-Sep-05	21-Oct-05
JC-N	LINE SUMM JC 230 KV SUMM JC-TRAYNOR U1035		19-Sep-05	21-Oct-05
JC-S	LINE NEWPROSP 230 KV NEW PROSPECT RD- SMITHBURG		12-Sep-05	16-Sep-05
OVEC	XFMR CLIFTYCR 345 KV CLIFTYCR 100A	XFORMER	2-Apr-04	31-May-06
OVEC	XFMR CLIFTYCR 345 KV CLIFTYCR 100B	XFORMER	1-Oct-04	31-May-06
PEP	XFMR BENNING 230 KV BENNING STA-8T	XFORMER	19-Sep-05	7-Oct-05
PL	LINE ELIMSPOR 230 KV ELIMSPOR-SUNBURY		29-Aug-05	30-Sep-05
PL	XFMR LYCOMING 230 KV LYCOMING 2	XFORMER	19-Sep-05	23-Sep-05
PN	XFMR WAYNE 345 KV WAYNE NO2 TX	XFORMER	2-Apr-05	31-Dec-05
PS-S	LINE HOPECREE 500 KV HOPECREE-REDLION 5015		13-Sep-05	18-Sep-05



# October 2005 Outages(230 kV and above)

<b>ZONE</b>	<b>FACILITY NAME</b>	<b>Start</b>	<b>End</b>
AE	LINE CARDIFF 230 KV CARDIFF-CEDAR	17-Oct-05	21-Oct-05
AEP	LINE BAKER 765 KV BAKER-BROADFO2	15-Oct-05	23-Oct-05
AEP	LINE CLOVERD2 765 KV CLOVERD2-JACKSONS	24-Oct-05	11-Nov-05
AEP	LINE DARWIN 345 KV DARWIN-EUGENE	24-Oct-05	28-Oct-05
AEP	LINE HAYDEN 345 KV HAYDEN-ROBERTS2	3-Oct-05	28-Oct-05
AEP	LINE KAMMER2 765 KV KAMMER2-SCANTON2	10-Oct-05	14-Oct-05
AEP	XFMR KAMMER2 345 KV KAMMER2 .100 XFORMER	1-May-05	31-Dec-05
AEP	XFMR KAMMER2 345 KV KAMMER2 .300 XFORMER	4-Feb-05	31-Dec-05
AEP	XFMR SCANTON2 765 KV SCANTON2 . 3 XFORMER	10-Oct-05	14-Oct-05
AEP	XFMR TIDD_AEP 345 KV TIDD_AEP A-P XFORMER	13-Jul-04	31-Dec-05
AEP	XFMR TRISTATE 345 KV TRISTATE 3 XFORMER	7-Aug-04	1-Jan-20
APS	LINE BEDINGTO 500 KV BEDINGTO-DOUBS 500KV	10-Oct-05	14-Oct-05
APS	LINE BOONSBOR 230 KV BOONBOR-FROSTOWN	14-Mar-05	11-Nov-05
APS	LINE FTMARTIN 500 KV FTMARTIN-PRUNTYTO	17-Oct-05	21-Oct-05
APS	LINE MEADOWBR 500 KV MEADOWBR-MORRISVI	10-Oct-05	26-Oct-05
APS	XFMR BELMONT 500 KV BELMONT TRAN 3 XFORMER	17-Oct-05	21-Oct-05
APS	XFMR BOONSBOR 230 KV BOONSBOR T1 XFORMER	14-Mar-05	11-Nov-05
APS	XFMR CABOT 500 KV CABOT TRAN 1 XFORMER	3-Oct-05	7-Oct-05



# October 2005 Outages(230 kV and above) continued

APS	XFMR DOUBS 500 KV DOUBS 500-1 XFORMER	4-Oct-05	18-Nov-05
APS	XFMR PRUNTYTO 500 KV PRUNTYTO TRAN 3 XFORMER	3-Oct-05	4-Nov-05
COMED	LINE 138 SILV 345 KV 138 SILV-154 LIBE 13821	3-Oct-05	7-Oct-05
COMED	LINE 7 STATE 345 KV STATELIN-SHEFFILD	3-Oct-05	7-Oct-05
COMED	XFMR 154 LIBE 345 KV 154 LIBERTY 45TR81 CT	3-Oct-05	7-Oct-05
COMED	XFMR 22 ZION 345 KV 22 ZION 45TR1E 24	22-Sep-05	28-Apr-06
COMED	XFMR 22 ZION 345 KV 22 ZION 45TR1W 24	22-Sep-05	28-Apr-06
COMED	XFMR 7 STATE 345 KV 7 STATE LIN 45TR81 CT	3-Oct-05	7-Oct-05
CONS	LINE PALISAD2 345 KV DCCOOK-PALISADE	24-Oct-05	25-Nov-05
DOM	LINE CUNNIHAM 500 KV CUNNIHAM-ELMONT4 553A	10-Oct-05	28-Oct-05
DOM	LINE GLEBE 230 KV GLEBE -PENTAGON 2036A	17-Oct-05	23-Oct-05
DOM	LINE GLEBE 230 KV GLEBE -PENTAGON 2037A	24-Oct-05	28-Oct-05
DOM	LINE GREENWCH 230 KV GREENWCH-CHESAPKE 262A	19-Sep-05	1-Dec-05
DOM	LINE LADYSMTH 500 KV LADYSMTH-NANNA4 575A	3-Oct-05	7-Oct-05
DOM	LINE LADYSMTH 500 KV LADYSMTH-POSSUMP4 568A	10-Oct-05	15-Oct-05
DOM	LINE MTSTORM4 500 KV MTSTORM-PRUNTYTO	1-Oct-05	9-Oct-05
DOM	LINE VALLEY4 500 KV VALLEY4 -BATHCO 548A	3-Oct-05	23-Nov-05
DOM	LINE YADKIN4 230 KV YADKIN4 -CHESAPKE 262B	19-Sep-05	1-Dec-05
DOM	SD VALLEY4 500 KV VALLEY4 548CAPA SER DEV	3-Oct-05	23-Nov-05
DOM	XFMR BATHCO 500 KV BATHCO TR34 XFORMER	4-Oct-05	28-Oct-05



# October 2005 Outages(230 kV and above) continued

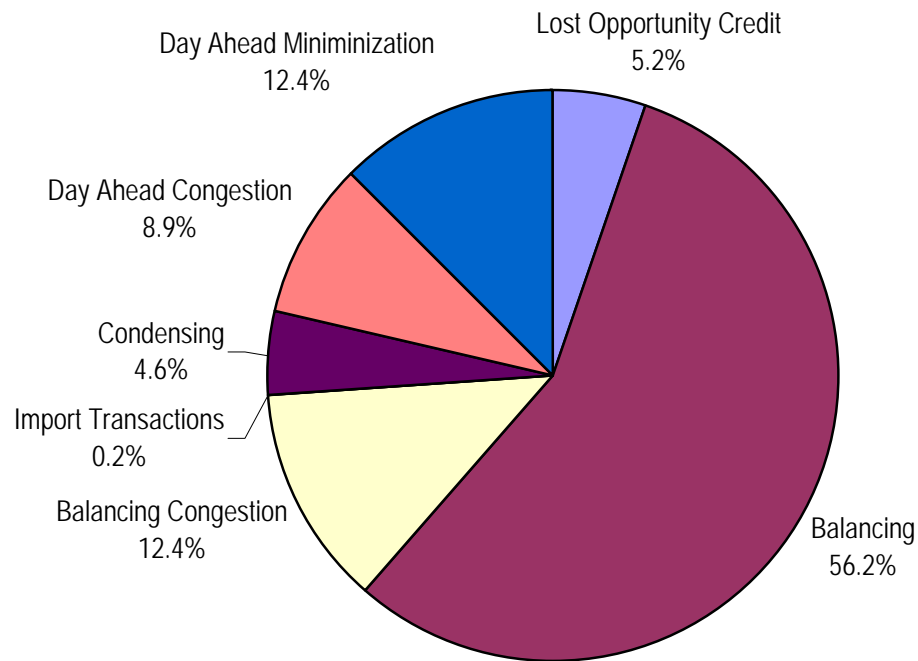
DOM	XFMR GAINESVL 230 KV GAINESVL TX2	XFORMER	13-Jun-05	19-May-06
DOM	XFMR LOUISACT 230 KV LOUISACT TG1	XFORMER	17-May-05	31-Dec-05
DOM	XFMR LOUISACT 230 KV LOUISACT TG4	XFORMER	17-May-05	31-Dec-05
DOM	XFMR PENTAGON 230 KV PENTAGON TX1	XFORMER	17-Oct-05	21-Oct-05
DOM	XFMR PENTAGON 230 KV PENTAGON TX3	XFORMER	24-Oct-05	28-Oct-05
DOM	XFMR PENTAGON 230 KV PENTAGON TX4	XFORMER	24-Oct-05	28-Oct-05
DOM	XFMR TROWBRDG 230 KV TROWBRDG TX1	XFORMER	24-Oct-05	28-Oct-05
DPL	LINE DOVER 230 KV DOVER-MILFORD		24-Oct-05	29-Oct-05
DUQU	XFMR CARS DUQ 345 KV CARS DUQ T2	XFORMER	13-Jun-05	31-Dec-05
JC-N	LINE GILLETTE 230 KV GILLETTE-SUMM JC U1035		19-Sep-05	21-Oct-05
JC-N	LINE SUMM JC 230 KV SUMM JC-TRAYNOR U1035		19-Sep-05	21-Oct-05
JC-S	LINE ATLANTIC 230 KV ATLANTIC-NEW PROSPECT ROAD		24-Oct-05	28-Oct-05
JC-S	LINE EWINDSOR 500 KV EWINDSOR-SALEM 5021		24-Oct-05	28-Oct-05
JC-S	LINE NEWPROSP 230 KV NEW PROSPECT RD- SMITHBURG		10-Oct-05	14-Oct-05
ME	LINE JACK ME 230 KV JACK ME-TMI 1051		18-Oct-05	17-Nov-05
ME	XFMR TMI 500 KV TMI 1 BANK	XFORMER	10-Oct-05	14-Oct-05
OVEC	XFMR CLIFTYCR 345 KV CLIFTYCR 100A	XFORMER	2-Apr-04	31-May-06
OVEC	XFMR CLIFTYCR 345 KV CLIFTYCR 100B	XFORMER	1-Oct-04	31-May-06
PE	LINE GRAYSFER 230 KV GRAYSFER-PARRISH 220-27		24-Oct-05	28-Oct-05
PE	LINE PLYMOUTH 230 KV PLYMOUTH-WHITEMAR 220-41		17-Oct-05	22-Oct-05



# October 2005 Outages(230 kV and above) continued

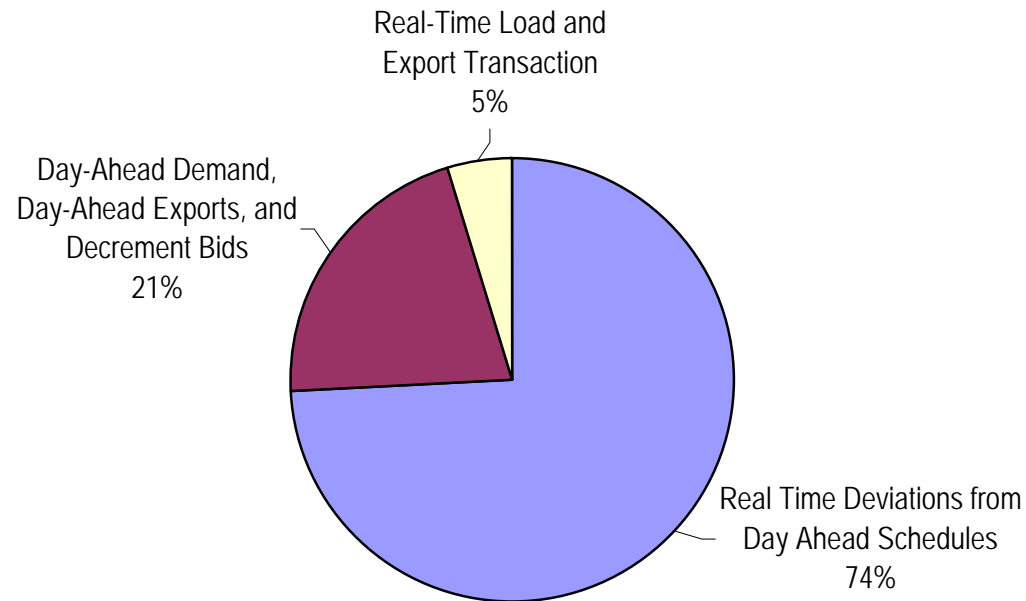
PE	LINE PULASKI 230 KV PULASKI-WHITEMAR 220-41	17-Oct-05	22-Oct-05
PE	XFMR PLANE BRO 230 KV PLANE BRO PLA 9TR XFORMER	21-Oct-05	28-Oct-05
PEP	XFMR BENNING 230 KV BENNING STA-8T XFORMER	19-Sep-05	7-Oct-05
PL	LINE BUXMONT 230 KV BUXMONT-HOSENSAC 220-10	17-Oct-05	21-Oct-05
PL	LINE ELDRED 230 KV ELDRED-SUNBURY	17-Oct-05	18-Nov-05
PL	XFMR JUNIATA 500 KV JUNIATA 1 XFORMER	24-Oct-05	28-Oct-05
PL	XFMR SUNBURY 230 KV SUNBURY 23 XFORMER	17-Oct-05	18-Nov-05
PN	XFMR WAYNE 345 KV WAYNE NO2 TX XFORMER	2-Apr-05	31-Dec-05
PS-N	XFMR WALDWICK 345 KV WALDWICK 345-1 XFORMER	3-Oct-05	22-Nov-05
UGI	LINE MOUN UGI 230 KV MOUN UGI-STANTON	10-Oct-05	28-Oct-05
UGI	LINE MOUN UGI 230 KV MOUN UGI-SUSQUEHA NO.1	10-Oct-05	28-Oct-05

Operating Reserves Credits: August 1, 2004 through July 31, 2005

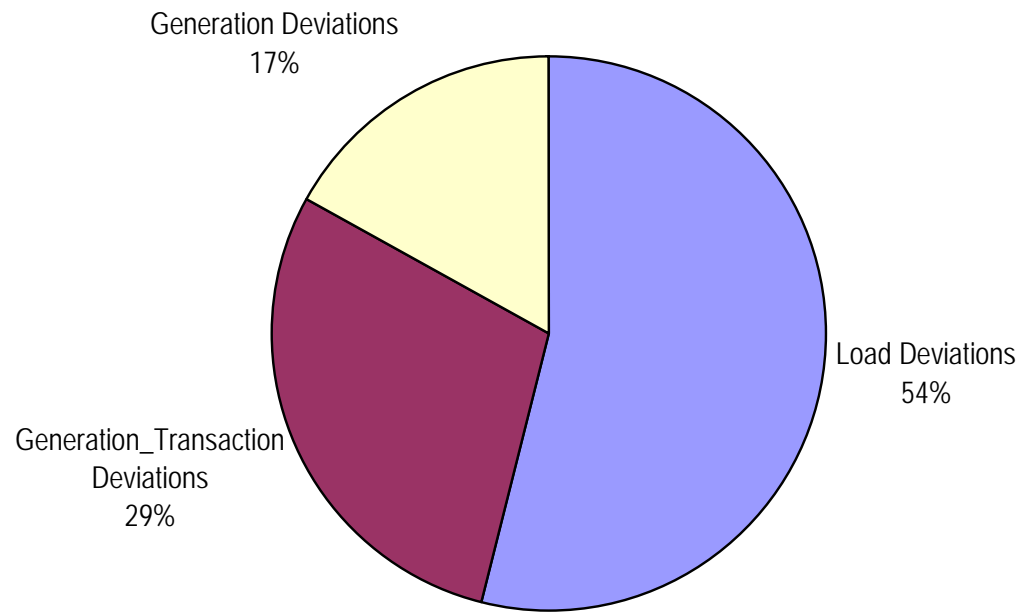


■ Lost Opportunity Credit 
 ■ Balancing 
 ■ Balancing Congestion 
 ■ Import Transactions 
 ■ Condensing 
 ■ Day Ahead Congestion 
 ■ Day Ahead Minimization

## Operating Reserves Charges: August 1, 2004 through July 31, 2005

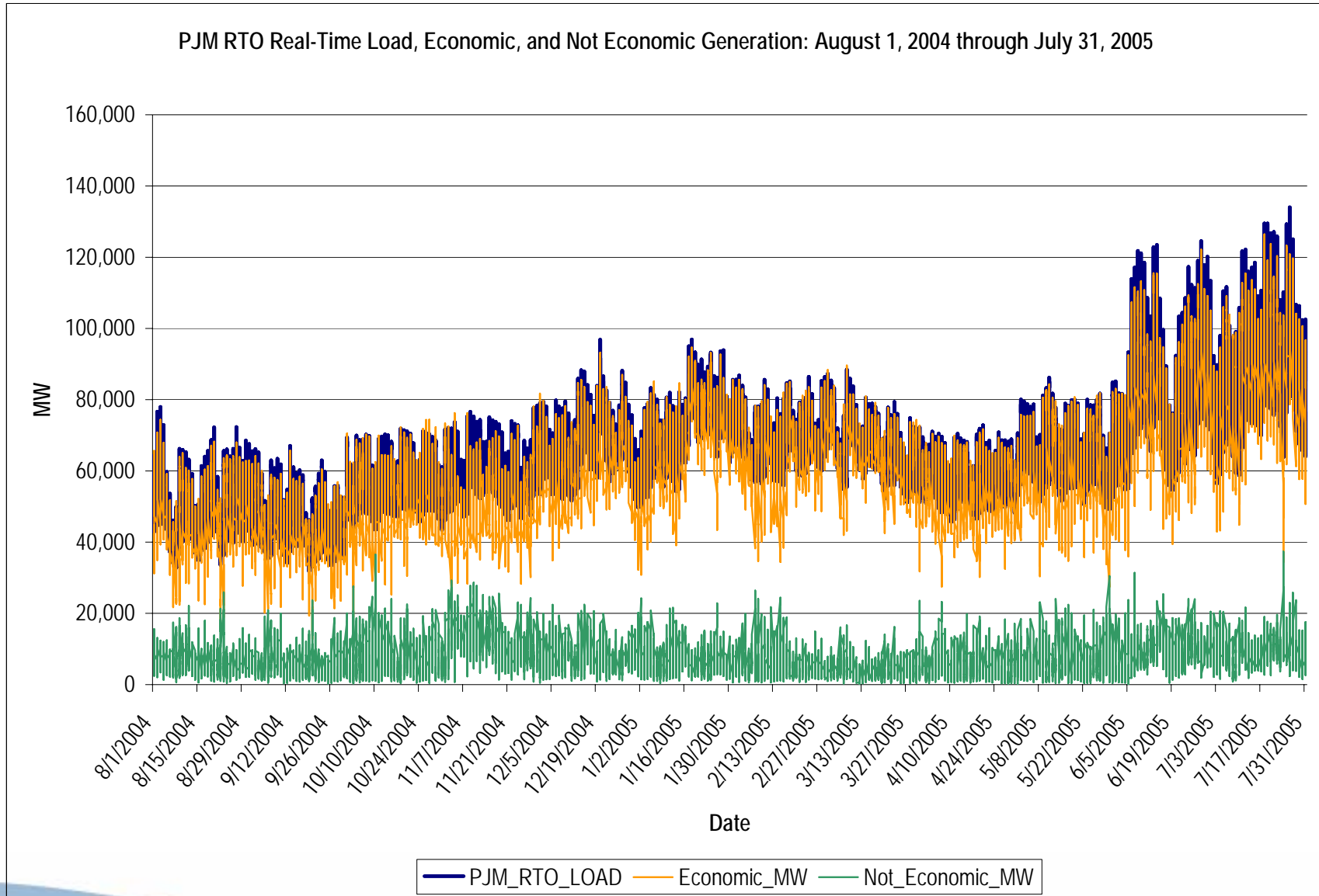


Balancing Operating Reserves Deviations (MW): August 1, 2004 through July 31, 2005



■ Load Deviations ■ Generation\_Transaction Deviations ■ Generation Deviations



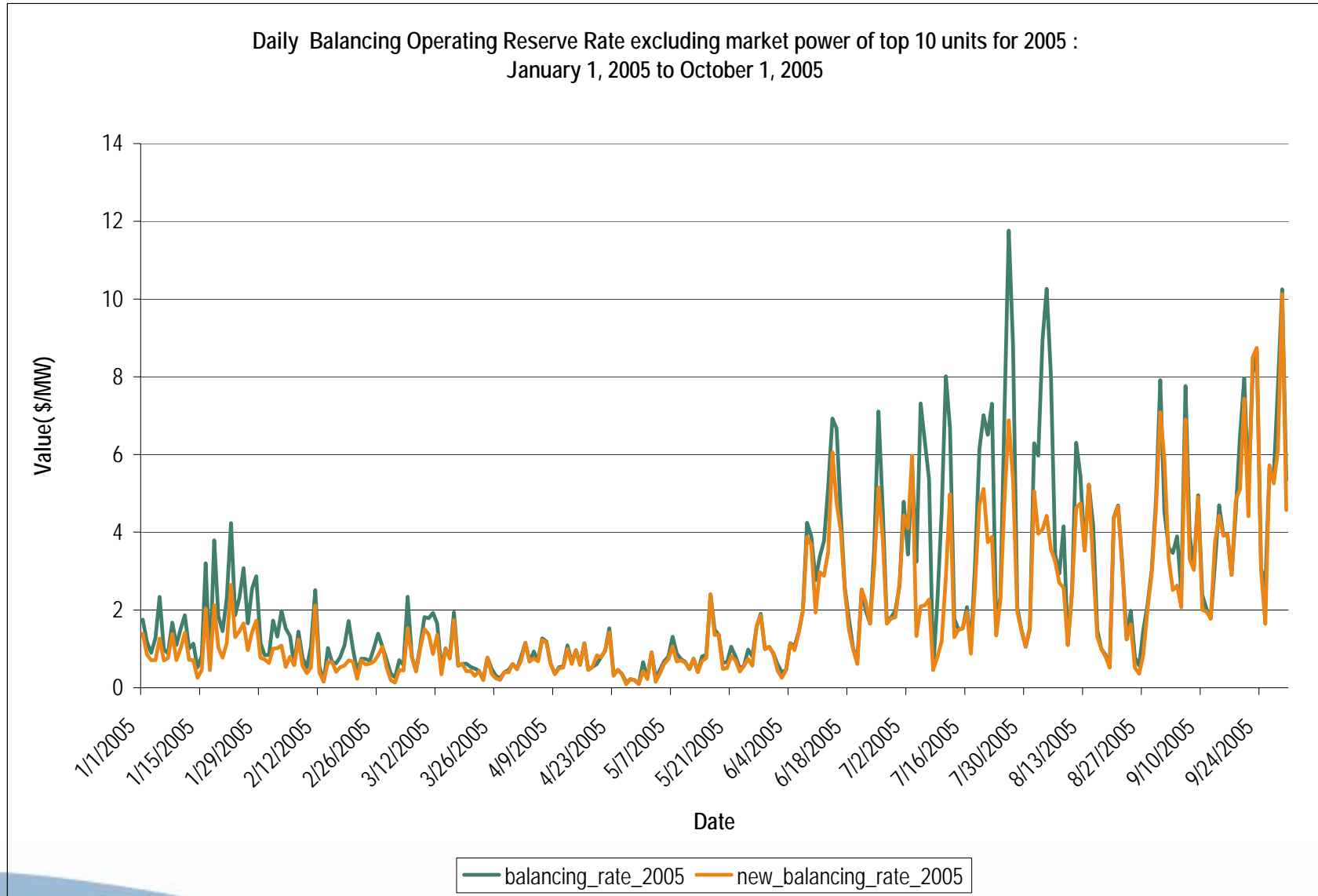


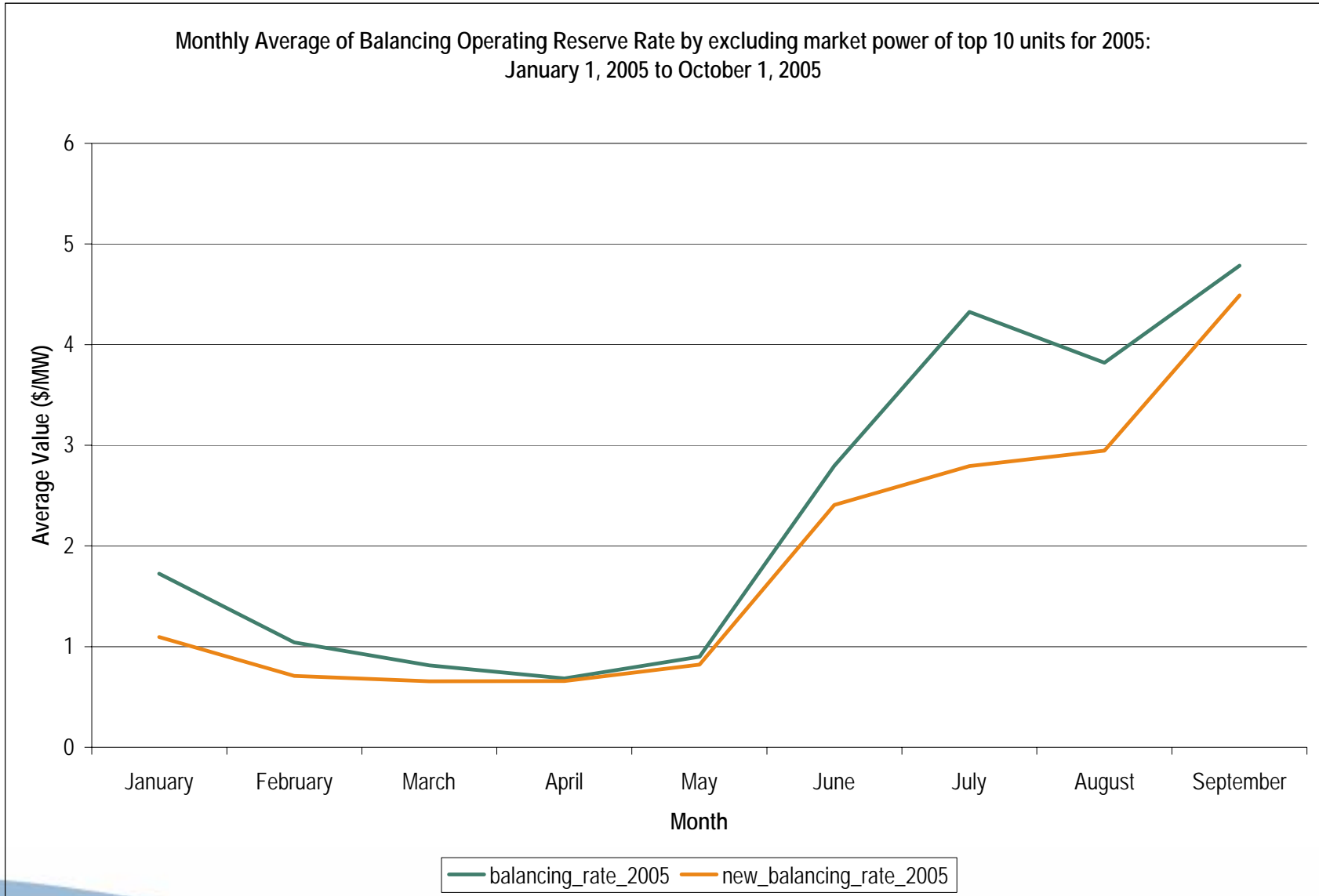
\* Economic: Bid  $\leq$  RT\_LMP and Not Economic: Bid  $>$  RT\_LMP

- Operating reserve payments concentrated among a relatively small number of units/owners
- The top ten units generally have:
  - Relatively high mark ups
    - Price offer over cost offer
  - Relatively inflexible operating parameters
    - Long minimum run times
    - Small number of starts per day
    - Long minimum down time
- Need to understand selection process for units providing operating reserves
  - Aggregate market
  - Locational issues

- The top ten units receiving operating reserve payments
  - Average = 41 percent of total operating reserve payments over last four years
  - Maximum = 47 percent
  - Minimum = 32 percent
- The mark up for all top ten units
  - Average = 9 percent
  - Maximum = 17 percent
  - Minimum = 3 percent
- The maximum mark up among the top ten units receiving operating reserve payments
  - Average = 44 percent over last four years
  - Maximum > 40 percent in each year

# Balancing Operating Reserve Rate by normalizing markup and parameters of top 10 units for 2005





- Limit exercise of local market power in operating reserve market
- Limit exercise of market power in aggregate operating reserve market
- Ensure that only flexible units are paid operating reserves