

# 2006 State of the Market Report

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**VOLUME II: DETAILED ANALYSIS**

**MARKET MONITORING UNIT  
MARCH 8, 2007**



## PREFACE

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The Market Monitoring Unit of PJM Interconnection publishes an annual state of the market report that assesses the state of competition in each market operated by PJM, identifies specific market issues and recommends potential enhancements to improve the competitiveness and efficiency of the markets.

The *2006 State of the Market Report* is the ninth such annual report. This report is submitted to the Board of PJM Interconnection pursuant to the PJM Open Access Transmission Tariff (OATT), Attachment M (PJM Market Monitoring Plan):

The Market Monitoring Unit shall prepare and submit to the PJM Board and to the PJM Members Committee, annual state-of-the-market reports on the state of competition within, and the efficiency of, the PJM Market. In such reports, the Market Monitoring Unit may make recommendations regarding any matter within its purview. The reports to the PJM Board shall include recommendations as to whether changes to the Market Monitoring Unit or the Plan are required.<sup>1</sup>

The Market Monitoring Unit is submitting this report simultaneously to the United States Federal Energy Regulatory Commission per the Commission's order:

The Commission has the statutory responsibility to ensure that public utilities selling in competitive bulk power markets do not engage in market power abuse and also to ensure that markets within the Commission's jurisdiction are free of design flaws and market power abuse. To that end, the Commission will expect to receive the reports and analyses of an RTO's [regional transmission organization's] market monitor at the same time they are submitted to the RTO.<sup>2</sup>

1 PJM, OATT, "Attachment M: PJM Market Monitoring Plan," Third Revised Sheet No. 452 (Effective July 17, 2006).

2 96 FERC ¶ 61,061 (2001).



# CONTENTS

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PREFACE	1
<b>SECTION 1 – INTRODUCTION</b>	<b>23</b>
<i>PJM Market Background</i>	23
<i>Conclusions</i>	23
<i>Recommendations</i>	24
Continued Action	24
New Action	25
<b>SECTION 2 – ENERGY MARKET, PART 1</b>	<b>29</b>
<i>Overview</i>	29
Market Structure	29
Market Conduct	31
Market Performance: Markup, Load and Locational Marginal Price	31
Demand-Side Response	32
Conclusion	32
<i>Market Structure</i>	34
Supply	34
Demand	36
Market Concentration	37
Local Market Structure and Offer Capping	40
Local Market Structure	42
Characteristics of Marginal Units	55
<i>Market Conduct</i>	57
Unit Markup	57
Unit Markup Characteristics	58
<i>Market Performance: Markup</i>	59
Markup Component of System Price	59
Markup Component of Zonal Prices	61
Markup by System Price Levels	62
Exempt Unit Markup	62
Frequently Mitigated Unit and Associated Unit Adders – Component of Price	63
Markup Component of Price on High-Load Days	65
<i>Market Performance: Load and LMP</i>	67
Load	67
Locational Marginal Price (LMP)	73
Real-Time Load, Generation, Bilateral and Spot Market	87
<i>Demand-Side Response (DSR)</i>	89
Emergency Program	90
Economic Program	92

Active Load Management (ALM)	99
Nonhourly Metered Customer Pilot	99
Price Impacts of Demand-Side Response	99
Customer Demand-Side Response Programs	100
<b>SECTION 3 – ENERGY MARKET, PART 2</b>	<b>103</b>
<b><i>Overview</i></b>	<b>103</b>
Net Revenue	103
Existing and Planned Generation	104
Scarcity	104
Credits and Charges for Operating Reserve	105
Conclusion	105
<b><i>Net Revenue</i></b>	<b>107</b>
Energy Market Net Revenue	110
Capacity Credit Market Net Revenue	113
Ancillary Service and Operating Reserve Net Revenue	114
New Entrant Net Revenue Analysis	114
Zonal Net Revenue	124
Net Revenue Adequacy	126
<b><i>Existing and Planned Generation</i></b>	<b>130</b>
Installed Capacity and Fuel Mix	130
Energy Production by Fuel Source	131
Planned Generation Additions	132
Definitions and Methodology	141
2006 Results: High Load and Scarcity Hours	144
Current Issues with Scarcity Implementation	150
Credit and Charge Categories	152
Credit and Charge Results	154
Characteristics of Credits and Charges	158
Market Power Issues	162
<b>SECTION 4 – INTERCHANGE TRANSACTIONS</b>	<b>167</b>
<b><i>Overview</i></b>	<b>167</b>
Interchange Transaction Activity	167
Interchange Transaction Topics	168
Interchange Transaction Issues	169
Conclusion	170
<b><i>Interchange Transaction Activity</i></b>	<b>172</b>
Aggregate Imports and Exports	172
Interface Imports and Exports	174
<b><i>Interchange Transaction Topics</i></b>	<b>180</b>
Operating Agreements with Bordering Areas	180
PJM TLRs	182
PJM Interface Pricing with Organized Markets	184

<b><i>Interchange Transaction Issues</i></b>	<b>191</b>
Loop Flows	191
Wisconsin Public Service Corporation (WPS) Complaint	200
Ramp Reservation Rule Change	201
<b>SECTION 5 – CAPACITY MARKET</b>	<b>207</b>
<b><i>Overview</i></b>	<b>208</b>
Market Structure	208
Market Performance	209
Generator Performance	209
Conclusion	209
<b><i>Market Structure</i></b>	<b>211</b>
Supply	211
Demand	213
Market Concentration	217
External and Internal Capacity Transactions	220
Active Load Management (ALM) Credits	222
<b><i>Market Performance</i></b>	<b>222</b>
Capacity Credit Market Volumes and Prices	222
<b><i>Generator Performance</i></b>	<b>228</b>
Generator Performance Factors	228
Generator Forced Outage Rates	229
<b>SECTION 6 – ANCILLARY SERVICE MARKETS</b>	<b>239</b>
<b><i>Overview</i></b>	<b>240</b>
Regulation Market	240
Synchronized Reserve Market	241
Conclusion	242
<b><i>Regulation Market</i></b>	<b>244</b>
Market Structure	244
Market Conduct	249
Market Performance	250
<b><i>Synchronized Reserve Market</i></b>	<b>253</b>
Market Structure	253
Market Conduct	260
Market Performance	261
<b>SECTION 7 – CONGESTION</b>	<b>265</b>
<b><i>Overview</i></b>	<b>265</b>
Congestion Cost	265
LMP Differentials and Facility or Zonal Congestion	266
Economic Planning Process	267
Conclusion	267

<b><i>Congestion</i></b>	<b>268</b>
Congestion Accounting	268
Total Calendar Year Congestion	269
Monthly Congestion	272
Hedged Congestion	272
LMP Differentials	274
<b><i>Congested Facilities</i></b>	<b>275</b>
Congestion by Facility Type and Voltage	275
Constraint Duration	278
Constraint Costs	279
Congestion-Event Summary for Midwest ISO Flowgates	280
Congestion-Event Summary for the 500 kV System	281
Congestion on the Bedington-Black Oak and AP South Interfaces	282
<b><i>Zonal Congestion</i></b>	<b>282</b>
Summary	282
Details of Regional and Zonal Congestion	283
<b><i>Economic Planning Process</i></b>	<b>301</b>
<b>SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS</b>	<b>303</b>
<b><i>Overview</i></b>	<b>304</b>
Financial Transmission Rights (FTRs)	304
Auction Revenue Rights (ARRs)	305
Conclusion	307
<b><i>Financial Transmission Rights</i></b>	<b>308</b>
Market Structure	308
Market Performance	314
<b><i>Auction Revenue Rights</i></b>	<b>326</b>
Market Structure	327
Market Performance	333
<b>APPENDIX A – PJM GEOGRAPHY</b>	<b>343</b>
<b>APPENDIX B – PJM MARKET MILESTONES</b>	<b>347</b>
<b>APPENDIX C – ENERGY MARKET</b>	<b>349</b>
<b><i>Load</i></b>	<b>349</b>
Frequency Distribution of Load	349
Off-Peak and On-Peak Load	350
<b><i>Locational Marginal Price (LMP)</i></b>	<b>351</b>
Real-Time LMP	352
Day-Ahead and Real-Time LMP	356
<b><i>Offer-Capped Units</i></b>	<b>363</b>
<b><i>Locational Net Revenue – Perfect Dispatch</i></b>	<b>367</b>



<b>APPENDIX D – INTERCHANGE TRANSACTIONS</b>	<b>371</b>
<i>NYISO Issues</i>	<i>371</i>
<i>Consolidated Edison Company (Con Edison) and Public Service Electric and Gas Company (PSE&amp;G) Wheeling Contracts</i>	<i>373</i>
Initial Implementation of the FERC Protocol	375
<b>APPENDIX E – CAPACITY MARKET</b>	<b>379</b>
<i>Background</i>	<i>379</i>
<i>Capacity Obligations</i>	<i>379</i>
Meeting Capacity Obligations	380
<i>Capacity Resources</i>	<i>380</i>
<i>Market Dynamics</i>	<i>381</i>
<i>2005 Baseline Capacity Market Data</i>	<i>382</i>
<i>Generator Performance: NERC OMC Outage Cause Codes</i>	<i>386</i>
<b>APPENDIX F – ANCILLARY SERVICE MARKETS</b>	<b>389</b>
<i>Area Control Error (ACE)</i>	<i>389</i>
Control Performance Standard (CPS) and Balancing Authority ACE Limit (BAAL)	389
<i>Regulation Capacity, Daily Offers, Offered and Eligible, Hourly Assigned</i>	<i>392</i>
<b>APPENDIX G – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS</b>	<b>395</b>
<i>FTR Target Allocations and Congestion Revenue</i>	<i>395</i>
<i>ARR Prorating Procedure</i>	<i>397</i>
<i>ARR Credit</i>	<i>398</i>
<b>APPENDIX H – CALCULATING LOCATIONAL MARGINAL PRICE</b>	<b>399</b>
<i>Hourly Integrated LMP and Hourly Integrated Load</i>	<i>399</i>
<i>Load-Weighted LMP</i>	<i>399</i>
<b>APPENDIX I – GENERATOR SENSITIVITY FACTORS</b>	<b>401</b>
<i>Hourly Integrated LMP Using UPF</i>	<i>402</i>
<i>Hourly Integrated Markup Effects Using UPFs</i>	<i>404</i>
<i>UPF-Weighted, Marginal Unit Markup</i>	<i>405</i>
<i>Hourly Integrated Load-Weighted, Historical, Cost-Adjusted LMP Using UPFs</i>	<i>406</i>
Fuel-Cost-Adjusted LMP	407
Cost-Adjusted LMP	408

<b>APPENDIX J – THREE PIVOTAL SUPPLIER TEST</b>	<b>411</b>
<i>Three Pivotal Supplier Test: Background</i>	<b>411</b>
<i>Market Structure Tests and Market Power Mitigation: Core Concepts</i>	<b>412</b>
<i>Three Pivotal Supplier Test: Mechanics</i>	<b>414</b>
<b>APPENDIX K – GLOSSARY</b>	<b>417</b>
<b>APPENDIX L – LIST OF ACRONYMS</b>	<b>427</b>
<b>APPENDIX M – ERRATA</b>	<b>439</b>

## TABLES

### SECTION 2 – ENERGY MARKET, PART 1

29

<i>Table 2-1 Retired units: October 1, 2005, to September 30, 2006</i>	36
<i>Table 2-2 Actual PJM footprint summer peak loads: 1999 to 2006</i>	36
<i>Table 2-3 PJM hourly energy market HHI: Calendar year 2006</i>	39
<i>Table 2-4 PJM hourly energy market HHI (By segment): Calendar year 2006</i>	39
<i>Table 2-5 Annual offer-capping statistics: Calendar years 2002 to 2006</i>	41
<i>Table 2-6 Offer-capped unit statistics: Calendar year 2006</i>	42
<i>Table 2-7 Three pivotal supplier results summary for regional constraints: March 1, to December 31, 2006</i>	44
<i>Table 2-8 Three pivotal supplier test details for regional constraints: March 1, to December 31, 2006</i>	45
<i>Table 2-9 Three pivotal supplier results summary for the East and Central Interfaces: March 1, to December 31, 2006</i>	45
<i>Table 2-10 Three pivotal supplier test details for the East and Central Interfaces: March 1, to December 31, 2006</i>	46
<i>Table 2-11 Three pivotal supplier results summary for constraints located in the PSEG Control Zone: March 1, to December 31, 2006</i>	46
<i>Table 2-12 Three pivotal supplier test details for constraints located in the PSEG Control Zone: March 1, to December 31, 2006</i>	47
<i>Table 2-13 Three pivotal supplier results summary for constraints located in the AP Control Zone: March 1, to December 31, 2006</i>	48
<i>Table 2-14 Three pivotal supplier test details for constraints located in the AP Control Zone: March 1, to December 31, 2006</i>	49
<i>Table 2-15 Three pivotal supplier results summary for constraints located in the AEP Control Zone: March 1, to December 31, 2006</i>	50
<i>Table 2-16 Three pivotal supplier test details for constraints located in the AEP Control Zone: March 1, to December 31, 2006</i>	51
<i>Table 2-17 Three pivotal supplier results summary for constraints located in the Met-Ed Control Zone: March 1, to December 31, 2006</i>	51
<i>Table 2-18 Three pivotal supplier test details for constraints located in the Met-Ed Control Zone: March 1, to December 31, 2006</i>	52
<i>Table 2-19 Three pivotal supplier results summary for constraints located in the PECO Control Zone: March 1, to December 31, 2006</i>	52
<i>Table 2-20 Three pivotal supplier test details for constraints located in the PECO Control Zone: March 1, to December 31, 2006</i>	52
<i>Table 2-21 Three pivotal supplier results summary for constraints located in the PENELEC Control Zone: March 1, to December 31, 2006</i>	53
<i>Table 2-22 Three pivotal supplier test details for constraints located in the PENELEC Control Zone: March 1, to December 31, 2006</i>	53
<i>Table 2-23 Three pivotal supplier results summary for constraints located in the Dominion Control Zone: March 1, to December 31, 2006</i>	53
<i>Table 2-24 Three pivotal supplier test details for constraints located in the Dominion Control Zone: March 1, to December 31, 2006</i>	54

<i>Table 2-25 Three pivotal supplier results summary for constraints located in the DPL Control Zone: March 1, to December 31, 2006</i>	54
<i>Table 2-26 Three pivotal supplier test details for constraints located in the DPL Control Zone: March 1, to December 31, 2006</i>	54
<i>Table 2-27 Three pivotal supplier results summary for constraints located in the AECO Control Zone: March 1, to December 31, 2006</i>	55
<i>Table 2-28 Three pivotal supplier test details for constraints located in the AECO Control Zone: March 1, to December 31, 2006</i>	55
<i>Table 2-29 Marginal unit contribution to LMP by company: Calendar year 2006</i>	56
<i>Table 2-30 Type of fuel used by marginal units: Calendar years 2004 to 2006</i>	56
<i>Table 2-31 Average marginal unit markup index by primary fuel and type of unit: Calendar year 2006</i>	58
<i>Table 2-32 Average marginal unit markup index by price category: Calendar year 2006</i>	58
<i>Table 2-33 Monthly markup components of load-weighted LMP: Calendar year 2006</i>	60
<i>Table 2-34 Average zonal markup component: Calendar year 2006</i>	61
<i>Table 2-35 Average markup by price category: Calendar year 2006</i>	62
<i>Table 2-36 Comparison of exempt and non-exempt markup component: Calendar year 2006</i>	63
<i>Table 2-37 Frequently mitigated units and associated units by month: Calendar year 2006</i>	64
<i>Table 2-38 Cost impact of FMUs and AUs by zone: Calendar year 2006</i>	65
<i>Table 2-39 Markup contribution of exempt and non-exempt units: Calendar year 2006</i>	66
<i>Table 2-40 PJM average real-time load: Calendar years 1998 to 2006</i>	67
<i>Table 2-41 Monthly minimum, average and maximum of PJM hourly THI: Calendar years 2005 to 2006</i>	70
<i>Table 2-42 Cleared day-ahead and real-time load (MWh): Calendar year 2006</i>	70
<i>Table 2-43 Day-ahead and real-time generation (MWh): Calendar year 2006</i>	72
<i>Table 2-44 PJM average hourly LMP (Dollars per MWh): Calendar years 1998 to 2006</i>	73
<i>Table 2-45 Zonal real-time energy market LMP (Dollars per MWh): Calendar years 2005 to 2006</i>	74
<i>Table 2-46 PJM load-weighted, average LMP (Dollars per MWh): Calendar years 1998 to 2006</i>	75
<i>Table 2-47 PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Year-over-year method</i>	78
<i>Table 2-48 Monthly PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Year-over-year method</i>	78
<i>Table 2-49 Zonal fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Calendar year 2006</i>	79
<i>Table 2-50 Components of annual PJM load-weighted, average LMP: Calendar year 2006</i>	80
<i>Table 2-51 Type of day-ahead marginal units: Calendar year 2006</i>	81
<i>Table 2-52 Day-ahead and real-time energy market LMP (Dollars per MWh): Calendar year 2006</i>	82
<i>Table 2-53 Zonal day-ahead and real-time energy market LMP (Dollars per MWh): Calendar year 2006</i>	87
<i>Table 2-54 Monthly average percentage of real-time self-supply load, bilateral supply load and spot supply load: Calendar years 2005 to 2006</i>	88
<i>Table 2-55 Emergency Program registration: Within 2002 to 2006</i>	90
<i>Table 2-56 Zonal capability in the Emergency Program: August 2, 2006</i>	91
<i>Table 2-57 Performance of Emergency Program participants: Calendar years 2002 to 2006</i>	92
<i>Table 2-58 Economic Program registration: Within 2002 to 2006</i>	92
<i>Table 2-59 Zonal capability in the Economic Program: August 2, 2006</i>	93
<i>Table 2-60 Performance of PJM Economic Program participants</i>	94
<i>Table 2-61 PJM Economic Program by zonal reduction: Calendar year 2006</i>	95
<i>Table 2-62 Frequency distribution of Economic Program hours when zonal LMP less than \$75 MWh (By hours): Calendar year 2006</i>	96

<i>Table 2-63 Frequency distribution of Economic Program hours when zonal LMP greater than or equal to \$75 per MWh (By hours): Calendar year 2006</i>	97
<i>Table 2-64 Frequency distribution of Economic Program zonal LMP (By hours): Calendar year 2006</i>	98
<i>Table 2-65 Available ALM MW: Within 2002 to 2006</i>	99
<i>Table 2-66 Demand-side response programs: Summer, 2006</i>	101

## **SECTION 3 – ENERGY MARKET, PART 2** **103**

<i>Table 3-1 PJM balancing energy market net revenue [By unit marginal cost (Dollars per MWh)]: Calendar years 1999 to 2006</i>	108
<i>Table 3-2 PJM day-ahead energy market net revenue [By unit marginal cost (Dollars per MWh)]: Calendar years 2000 to 2006</i>	109
<i>Table 3-3 PJM's average annual CCM price: Calendar years 1999 to 2006</i>	113
<i>Table 3-4 System average ancillary service revenues: Calendar years 1999 to 2006</i>	114
<i>Table 3-5 Burner tip average fuel price in PJM (Dollars per MBtu): Calendar years 1999 to 2006</i>	116
<i>Table 3-6 PJM balancing energy market new entrant gas-fired CT (Dollars per installed MW-year): Theoretical net revenue for calendar years 1999 to 2006</i>	116
<i>Table 3-7 PJM balancing energy market new entrant gas-fired CC (Dollars per installed MW-year): Theoretical net revenue for calendar years 1999 to 2006</i>	117
<i>Table 3-8 PJM balancing energy market new entrant CP (Dollars per installed MW-year): Theoretical net revenue for calendar years 1999 to 2006</i>	117
<i>Table 3-9 Balancing energy market net revenues for a CT under two dispatch scenarios (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	118
<i>Table 3-10 Balancing energy market net revenues for a CC under two dispatch scenarios (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	119
<i>Table 3-11 Balancing energy market net revenues for a CP under two dispatch scenarios (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	120
<i>Table 3-12 Day-ahead energy market net revenues for a CT under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	120
<i>Table 3-13 Day-ahead energy market net revenues for a CC under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	121
<i>Table 3-14 Day-ahead energy market net revenues for a CP under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	121
<i>Table 3-15 Balancing and day-ahead energy market net revenues for a CT under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	122
<i>Table 3-16 Balancing and day-ahead energy market net revenues for a CC under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	123
<i>Table 3-17 Balancing and day-ahead energy market net revenues for a CP under two dispatch scenarios (Dollars per installed MW-year): Calendar years 2000 to 2006</i>	123
<i>Table 3-18 Balancing energy market net revenue differentials by transmission zone for a CT under peak-hour dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	124
<i>Table 3-19 Balancing energy market net revenues by transmission zone for a CC under peak-hour dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	125
<i>Table 3-20 Balancing energy market net revenues by transmission zone for a CP under available-hour dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	126

<i>Table 3-21 New entrant first-year and 20-year levelized fixed costs [By plant type (Dollars per installed MW-year)]</i>	127
<i>Table 3-22 CT 20-year levelized fixed cost vs. perfect dispatch net revenue (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	128
<i>Table 3-23 CC 20-year levelized fixed cost vs. perfect dispatch net revenue (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	128
<i>Table 3-24 CP 20-year levelized fixed cost vs. perfect dispatch net revenue (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	129
<i>Table 3-25 Return on equity sensitivity for CT, CC and CP generators</i>	130
<i>Table 3-26 PJM capacity (By fuel source): January 1, May 31, June 1 and December 31, 2006</i>	131
<i>Table 3-27 PJM generation [By fuel source (GWh)]: Calendar year 2006</i>	131
<i>Table 3-28 Year-to-year capacity additions: Calendar years 2000 to 2006</i>	132
<i>Table 3-29 Queue comparison (MW): Calendar years 2006 vs. 2005</i>	133
<i>Table 3-30 Capacity in PJM queues (MW): At December 31, 2006</i>	134
<i>Table 3-31 Average project queue time: At December 31, 2006</i>	135
<i>Table 3-32 Capacity additions in active or under-construction queues by zone (MW): At December 31, 2006</i>	136
<i>Table 3-33 Existing PJM capacity 2006 [By zone and unit type (MW)]</i>	137
<i>Table 3-34 PJM capacity age (MW)</i>	138
<i>Table 3-35 Capacity additions in active or under-construction queues by LDA (MW): At December 31, 2006</i>	139
<i>Table 3-36 Comparison of generators 40 years and older with slated capacity additions (MW): Through 2010</i>	140
<i>Table 3-37 Zone-specific operating reserve targets and requirements</i>	143
<i>Table 3-38 PJM-called ALM: August 2 and August 3, 2006</i>	143
<i>Table 3-39 Scarcity-related emergency messages</i>	149
<i>Table 3-40 Operating reserve credits and charges</i>	152
<i>Table 3-41 Total day-ahead and balancing operating reserve charges: Calendar years 1999 to 2006</i>	155
<i>Table 3-42 Monthly operating reserve charges: Calendar years 2005 and 2006</i>	156
<i>Table 3-43 Monthly balancing operating reserve deviations (MWh): Calendar years 2005 and 2006</i>	157
<i>Table 3-44 Installed capacity percentage (By unit type): Calendar years 2005 and 2006</i>	159
<i>Table 3-45 PJM self-scheduled, economic, non-economic and regulation generation: Calendar year 2006</i>	160
<i>Table 3-46 PJM generation by unit type: Calendar year 2006</i>	160
<i>Table 3-47 PJM unit type generation distribution: Calendar year 2006</i>	160
<i>Table 3-48 Monthly balancing operating reserve charges and credits to generators (By location): Calendar year 2006</i>	162
<i>Table 3-49 Top 10 operating reserve revenue units (By percent of total system): Calendar years 2001 to 2006</i>	163
<i>Table 3-50 Top 10 operating reserve revenue units' markup: Calendar years 2001 to 2006</i>	164
<i>Table 3-51 Simple average generator markup: Calendar year 2006</i>	165
<i>Table 3-52 Balancing operating reserve rate for exempt units (Actual and markup-adjusted): Calendar year 2006</i>	165

## **SECTION 4 – INTERCHANGE TRANSACTIONS** **167**

<i>Table 4-1 Net interchange volume by interface (MWh x 1,000): Calendar year 2006</i>	175
<i>Table 4-2 Gross import volume by interface (MWh x 1,000): Calendar year 2006</i>	176
<i>Table 4-3 Gross export volume by interface (MWh x 1,000): Calendar year 2006</i>	177

<i>Table 4-4 Active pricing points: Calendar year 2006</i>	178
<i>Table 4-5 Active interfaces: Calendar year 2006</i>	178
<i>Table 4-6 Con Edison and PSE&amp;G wheeling settlements data: Calendar year 2006</i>	190
<i>Table 4-7 Net scheduled and actual PJM interface flows (MWh x 1,000): Calendar year 2006</i>	192
<i>Table 4-8 Timing requirements of new ramp reservation rule</i>	205

## **SECTION 5 – CAPACITY MARKET** **207**

<i>Table 5-1 PJM capacity summary (MW): Calendar year 2006</i>	212
<i>Table 5-2 PJM capacity market load obligation served: Calendar year 2006</i>	215
<i>Table 5-3 PJM capacity market load obligation served by PJM EDCs and affiliates: Calendar year 2006</i>	215
<i>Table 5-4 PJM capacity market load obligation served by non-PJM EDC affiliates: Calendar year 2006</i>	216
<i>Table 5-5 PJM capacity market load obligation served by non-EDC affiliates: Calendar year 2006</i>	216
<i>Table 5-6 PJM CCM HHI: Calendar year 2006</i>	218
<i>Table 5-7 PJM CCM three pivotal supplier residual supply index (RSI): Calendar year 2006</i>	219
<i>Table 5-8 PJM capacity: Calendar year 2006</i>	220
<i>Table 5-9 Daily available capacity vs. offered capacity: December 31, 2005, to January 12, 2006</i>	224
<i>Table 5-10 Daily available capacity vs. offered capacity: June 30, 2006, to July 12, 2006</i>	224
<i>Table 5-11 Monthly and multimonhly capacity volumes and prices: May to July 2006</i>	225
<i>Table 5-12 PJM Capacity Credit Market: Calendar year 2006</i>	226
<i>Table 5-13 PJM Capacity Credit Market: Calendar years 1999 to 2006</i>	227
<i>Table 5-14 Contribution to EFORd for specific unit types (Percentage points): Calendar years 2002 to 2006</i>	231
<i>Table 5-15 Percent change in contribution to EFORd (Unit type): 2006 compared to 2005</i>	232
<i>Table 5-16 Five-year PJM EFORd data comparison to NERC five-year average for different unit types: Calendar years 2002 to 2006</i>	232
<i>Table 5-17 Outage cause contribution to PJM EFOF: Calendar year 2006</i>	234
<i>Table 5-18 Contribution to EFOF by unit type for the most prevalent causes: Calendar year 2006</i>	235
<i>Table 5-19 Contribution to EFOF by unit type: Calendar year 2006</i>	235
<i>Table 5-20 PJM EFORd vs. XEFORd: Calendar year 2006</i>	237

## **SECTION 6 – ANCILLARY SERVICE MARKETS** **239**

<i>Table 6-1 PJM regulation capability, daily offer and hourly eligible: Calendar year 2006</i>	246
<i>Table 6-2 PJM cleared regulation HHI: Calendar year 2006</i>	247
<i>Table 6-3 Top three cleared regulation market shares: Calendar year 2006</i>	248
<i>Table 6-4 Regulation market pivotal suppliers: Calendar year 2006</i>	248
<i>Table 6-5 The PJM Mid-Atlantic Region's Tier 2 cleared synchronized reserve market shares: Calendar year 2006</i>	258
<i>Table 6-6 The PJM ComEd Control Zone's Tier 2 cleared synchronized reserve market shares: Calendar year 2006</i>	258
<i>Table 6-7 The Mid-Atlantic Region's and the ComEd Control Zone's Tier 2 synchronized reserve market percent pivotal supplier hours: Calendar year 2006</i>	259

**SECTION 7 – CONGESTION****265**

<i>Table 7-1 Total annual PJM FTR revenues [Dollars (millions)]: Calendar years 2002 to 2006</i>	270
<i>Table 7-2 Total annual PJM congestion [Dollars (millions)]: Calendar years 2002 to 2006</i>	270
<i>Table 7-3 Total annual PJM FTR revenue detail [Dollars (millions)]: Calendar year 2006</i>	271
<i>Table 7-4 Monthly PJM congestion revenue statistics [Dollars (millions)]: Calendar years 2005 to 2006</i>	272
<i>Table 7-5 Monthly PJM congestion accounting summary [Dollars (millions)]: By planning period</i>	273
<i>Table 7-6 Annual average zonal LMP differentials [Reference to Western Hub (Dollars per MWh)]: Calendar years 2005 to 2006</i>	274
<i>Table 7-7 Congestion summary (By facility type): Calendar years 2005 to 2006</i>	276
<i>Table 7-8 Congestion summary (By facility voltage): Calendar years 2005 to 2006</i>	277
<i>Table 7-9 Congestion-event summary: Calendar years 2005 to 2006</i>	278
<i>Table 7-10 Total annual PJM congestion costs (By facility): Calendar years 2005 to 2006</i>	279
<i>Table 7-11 Top congestion cost impacts for Midwest ISO flowgates impacting PJM dispatch (By facility): Calendar years 2005 to 2006</i>	280
<i>Table 7-12 Regional constraints summary (By facility): Calendar years 2005 to 2006</i>	281
<i>Table 7-13 Congestion cost summary (By zone): Calendar years 2005 to 2006</i>	283
<i>Table 7-14 AECO Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	284
<i>Table 7-15 BGE Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	285
<i>Table 7-16 DPL Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	286
<i>Table 7-17 JCPL Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	287
<i>Table 7-18 Met-Ed Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	288
<i>Table 7-19 PECO Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	289
<i>Table 7-20 PENELEC Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	290
<i>Table 7-21 PEPCO Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	291
<i>Table 7-22 PPL Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	292
<i>Table 7-23 PSEG Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	293
<i>Table 7-24 RECO Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	294
<i>Table 7-25 AEP Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	295
<i>Table 7-26 AP Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	296
<i>Table 7-27 ComEd Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	297
<i>Table 7-28 DAY Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	298
<i>Table 7-29 DLCO Control Zone top congestion cost impacts (By facility): Calendar years 2005 to 2006</i>	299
<i>Table 7-30 Dominion Control Zone top congestion cost impacts (By facility): Phase 5, 2005 to December 31, 2006</i>	300

**SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS****303**

<i>Table 8-1 Top 10 principal binding transmission constraints limiting the Annual FTR Auction: Planning period 2006 to 2007</i>	309
<i>Table 8-2 Eligibility for ARRs vs. directly allocated FTRs</i>	312
<i>Table 8-3 Annual FTR market volume: Planning period 2006 to 2007</i>	312
<i>Table 8-4 Monthly balance of planning period FTR auction market volume: Planning period 2006 to 2007 through December 31, 2006</i>	313



<i>Table 8-5 Comparison of self-scheduled FTRs: Planning periods 2004 to 2005, 2005 to 2006 and 2006 to 2007</i>	314
<i>Table 8-6 Annual cleared average prices and volume for FTR obligations and options: Planning periods 2005 to 2006 and 2006 to 2007</i>	315
<i>Table 8-7 Annual and monthly balance of planning period FTR auction volume, price and revenue: Planning period 2006 to 2007</i>	316
<i>Table 8-8 Monthly balance of planning period FTR auction cleared buy-bid volume (MW per period): Planning period 2006 to 2007 through December 31, 2006</i>	318
<i>Table 8-9 Monthly balance of planning period FTR auction cleared average buy-bid price per period (\$/MWh): Planning period 2006 to 2007 through December 31, 2006</i>	318
<i>Table 8-10 Corresponding control zones for the highest revenue producing FTR sinks and sources in the Annual FTR Auction: Planning period 2006 to 2007</i>	320
<i>Table 8-11 Corresponding control zones for the highest revenue producing FTR sinks and sources in the monthly Balance of Planning Period FTR Auctions: Planning period 2006 to 2007 through December 31, 2006</i>	322
<i>Table 8-12 Top 10 principal binding transmission constraints limiting the annual ARR allocation: Planning period 2006 to 2007</i>	329
<i>Table 8-13 ARRs automatically reassigned for network load changes by control zone (MW-day): June 1, 2004, to December 31, 2006</i>	332
<i>Table 8-14 ARR revenue automatically reassigned for network load changes by control zone [Dollars (thousands) per MW-day]: June 1, 2004, to December 31, 2006</i>	333
<i>Table 8-15 Annual ARR allocation volume: Planning periods 2004 to 2005, 2005 to 2006 and 2006 to 2007</i>	334
<i>Table 8-16 ARR revenue adequacy [Dollars (millions)]: Planning periods 2004 to 2005, 2005 to 2006 and 2006 to 2007</i>	335
<i>Table 8-17 ARR and self-scheduled FTR congestion hedging by control zone: Planning period 2005 to 2006</i>	338
<i>Table 8-18 FTR congestion hedging by control zone: Planning period 2005 to 2006</i>	340
<i>Table 8-19 ARR and FTR congestion hedging by control zone: Planning period 2005 to 2006</i>	341
<i>Table 8-20 ARR and FTR congestion hedging: Planning periods 2005 to 2006 and 2006 to 2007</i>	342

## **APPENDIX C – ENERGY MARKET** **349**

<i>Table C-1 Frequency distribution of hourly PJM real-time load: Calendar years 2002 to 2006</i>	350
<i>Table C-2 Off-peak and on-peak load (MW): Calendar years 1998 to 2006</i>	351
<i>Table C-3 Multiyear change in load: Calendar years 1998 to 2006</i>	351
<i>Table C-4 Frequency distribution by hours of PJM real-time energy market LMP (Dollars per MWh): Calendar years 2002 to 2006</i>	353
<i>Table C-5 Off-peak and on-peak, load-weighted LMP (Dollars per MWh): Calendar years 2005 to 2006</i>	354
<i>Table C-6 On-peak PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Year-over-year method</i>	355
<i>Table C-7 Off-peak PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Year-over-year method</i>	355
<i>Table C-8 Load-weighted, average LMP during constrained hours (Dollars per MWh): Calendar years 2005 to 2006</i>	355
<i>Table C-9 Load-weighted, average LMP during constrained and unconstrained hours (Dollars per MWh): Calendar years 2005 to 2006</i>	356
<i>Table C-10 Frequency distribution by hours of PJM day-ahead LMP (Dollars per MWh): Calendar year 2002 to 2006</i>	357

<i>Table C-11 Off-peak and on-peak hourly LMP (Dollars per MWh): Calendar year 2006</i>	358
<i>Table C-12 Zonal on-peak hourly LMP (Dollars per MWh): Calendar year 2006</i>	360
<i>Table C-13 Zonal off-peak hourly LMP (Dollars per MWh): Calendar year 2006</i>	361
<i>Table C-14 LMP during constrained and unconstrained hours (Dollars per MWh): Calendar year 2006</i>	363
<i>Table C-15 Average day-ahead, offer-capped units: Calendar years 2002 to 2006</i>	364
<i>Table C-16 Average day-ahead, offer-capped MW: Calendar years 2002 to 2006</i>	364
<i>Table C-17 Average real-time, offer-capped units: Calendar years 2002 to 2006</i>	365
<i>Table C-18 Average real-time, offer-capped MW: Calendar years 2002 to 2006</i>	365
<i>Table C-19 Offer-capped unit statistics: Calendar year 2002</i>	366
<i>Table C-20 Offer-capped unit statistics: Calendar year 2003</i>	366
<i>Table C-21 Offer-capped unit statistics: Calendar year 2004</i>	367
<i>Table C-22 Offer-capped unit statistics: Calendar year 2005</i>	367
<i>Table C-23 Balancing energy market net revenues by control zone for a CT under perfect dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	368
<i>Table C-24 Balancing energy market net revenues by control zone for a CC under perfect dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	368
<i>Table C-25 Balancing energy market net revenues by control zone for a CP under perfect dispatch (Dollars per installed MW-year): Calendar years 1999 to 2006</i>	369
<b>APPENDIX D – INTERCHANGE TRANSACTIONS</b>	<b>371</b>
<i>Table D-1 Con Edison and PSE&amp;G wheel settlements data: Calendar year 2006</i>	376
<b>APPENDIX E – CAPACITY MARKET</b>	<b>379</b>
<i>Table E-1 PJM's ComEd PCI period capacity summary (MW): June to December 2005</i>	383
<i>Table E-2 PJM's ComEd PCI period capacity market load obligation served: June to December 2005</i>	383
<i>Table E-3 PJM's ComEd PCI period capacity market load obligation served by PJM EDCs and affiliates: June to December 2005</i>	384
<i>Table E-4 PJM's ComEd PCI period capacity market load obligation served by non-PJM EDC affiliates: June to December 2005</i>	384
<i>Table E-5 PJM's ComEd PCI period capacity market load obligation served by non-EDC affiliates: June to December 2005</i>	385
<i>Table E-6 PJM's ComEd PCI period CCM HHI: June to December 2005</i>	385
<i>Table E-7 PJM's ComEd PCI period CCM three pivotal supplier residual supply index (RSI): June to December 2005</i>	386
<i>Table E-8 PJM's ComEd PCI period CCM: June to December 2005</i>	386
<i>Table E-9 NERC GADS cause codes deemed outside management control (OMC)</i>	387
<b>APPENDIX G – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS</b>	<b>395</b>
<i>Table G-1 Congestion revenue, FTR target allocations and FTR congestion credits: Illustration</i>	396
<i>Table G-2 ARR allocation prorating procedure: Illustration</i>	397
<i>Table G-3 ARR credits: Illustration</i>	398
<i>Table I-1 LMP at bus X</i>	402

## FIGURES

### SECTION 2 – ENERGY MARKET, PART 1 29

<i>Figure 2-1 Average PJM aggregate supply curves: Summers 2005 and 2006</i>	35
<i>Figure 2-2 PJM summer peak-load comparison: Wednesday, August 2, 2006, and Tuesday, July 26, 2005</i>	37
<i>Figure 2-3 PJM hourly energy market HHI: Calendar year 2006</i>	40
<i>Figure 2-4 Load-weighted unit markup index: Calendar year 2006</i>	57
<i>Figure 2-5 Markup price impact duration curve: Calendar year 2006</i>	60
<i>Figure 2-6 Average hourly markup and load: Summer 2006</i>	66
<i>Figure 2-7 PJM real-time load duration curves: Calendar years 2002 to 2006</i>	68
<i>Figure 2-8 PJM average real-time load: Calendar years 2005 to 2006</i>	69
<i>Figure 2-9 Day-ahead and real-time loads (Average hourly volumes): Calendar year 2006</i>	71
<i>Figure 2-10 Day-ahead and real-time generation (Average hourly volumes): Calendar year 2006</i>	72
<i>Figure 2-11 Price duration curves for the PJM Real-Time Energy Market during hours above the 95th percentile: Calendar years 2002 to 2006</i>	75
<i>Figure 2-12 Monthly load-weighted, average LMP: Calendar years 2002 to 2006</i>	76
<i>Figure 2-13 Spot average fuel price comparison: Calendar years 2005 to 2006</i>	77
<i>Figure 2-14 PJM day-ahead aggregate supply curves: 2006 example day</i>	81
<i>Figure 2-15 PJM price duration curves for the Day-Ahead and Real-Time Energy Market: Calendar year 2006</i>	83
<i>Figure 2-16 Hourly real-time minus day-ahead average LMP: Calendar year 2006</i>	84
<i>Figure 2-17 Monthly real-time minus day-ahead average LMP: Calendar year 2006</i>	85
<i>Figure 2-18 PJM hourly system average LMP: Calendar year 2006</i>	86

### SECTION 3 – ENERGY MARKET, PART 2 103

<i>Figure 3-1 PJM balancing energy market net revenue (By unit marginal cost): Calendar years 1999 to 2006</i>	112
<i>Figure 3-2 PJM day-ahead energy market net revenue (By unit marginal cost): Calendar years 2000 to 2006</i>	112
<i>Figure 3-3 RTEP project completion probability as function of days in queue</i>	135
<i>Figure 3-4 High-load day hourly load and average hourly load: Summer 2006</i>	144
<i>Figure 3-5 Net within-hour resources: July 17 to July 19, and July 31, 2006</i>	145
<i>Figure 3-6 Net within-hour resources: August 1 to August 3, and August 7, 2006</i>	145
<i>Figure 3-7 Within-hour maximum emergency capacity relative to hourly demand in excess of within-hour economic resources: August 1 to August 2, 2006</i>	146
<i>Figure 3-8 Comparison of hourly maximum emergency capacity on maximum generation alert days to the hourly summer average maximum emergency capacity: Summer 2006</i>	147
<i>Figure 3-9 Within hour emergency resources: July 17 to July 19, and July 31, 2006</i>	148
<i>Figure 3-10 Within-hour emergency resources: August 1 to August 3, and August 7, 2006</i>	149
<i>Figure 3-11 Monthly average balancing operating reserve rate: Calendar years 2002 to 2006</i>	158
<i>Figure 3-12 Operating reserve credits: Calendar year 2006</i>	161

<b>SECTION 4 – INTERCHANGE TRANSACTIONS</b>	<b>167</b>
<i>Figure 4-1 PJM real-time imports and exports: Calendar year 2006</i>	173
<i>Figure 4-2 PJM day-ahead imports and exports: Calendar year 2006</i>	173
<i>Figure 4-3 PJM import and export transaction volume history: Calendar years 1999 to 2006</i>	174
<i>Figure 4-4 PJM's footprint and its external interfaces</i>	179
<i>Figure 4-5 Credits for coordinated congestion management: Calendar year 2006</i>	181
<i>Figure 4-6 PJM and Midwest ISO TLR procedures: Calendar years 2005 and 2006</i>	183
<i>Figure 4-7 Number of unique PJM flowgates: Calendar years 2005 to 2006</i>	183
<i>Figure 4-8 Daily hourly average price difference (Midwest ISO Interface minus PJM/MISO): Calendar year 2006</i>	185
<i>Figure 4-9 Monthly hourly average Midwest ISO PJM interface price and the PJM/MISO price: April 2005 to 2006</i>	186
<i>Figure 4-10 Daily hourly average price difference (NY proxy - PJM/NYIS): Calendar year 2006</i>	187
<i>Figure 4-11 Monthly hourly average NYISO/PJM proxy bus price and the PJM/NYIS price: Calendar years 2002 to 2006</i>	188
<i>Figure 4-12 PJM, NYISO and Midwest ISO border price averages: Calendar year 2006</i>	189
<i>Figure 4-13 PJM/MECS interface average actual minus scheduled volume: Calendar year 2006</i>	193
<i>Figure 4-14 PJM/TVA average flows: January 1 to September 30, 2006, preconsolidation</i>	194
<i>Figure 4-15 PJM/TVA average flows: October 1 to December 31, postconsolidation</i>	194
<i>Figure 4-16 Southwest actual and scheduled flows: Calendar year 2006</i>	195
<i>Figure 4-17 Southeast actual and scheduled flows: Calendar year 2006</i>	196
<i>Figure 4-18 Southeast minus southwest LMP: January to September 2006</i>	197
<i>Figure 4-19 SOUTHEXP minus SOUTHIMP LMP: October to December 2006</i>	199
<i>Figure 4-20 Absolute LMP difference of PJM and MISO border prices</i>	201
<i>Figure 4-21 Number of PJM automatic ramp reservation denials by month: January 2005 to July 2006</i>	202
<i>Figure 4-22 Distribution of expired ramp reservations in the hour prior to flow [old rules (theoretical) and new rules (actual)]: October to December 2006</i>	203
<i>Figure 4-23 Partial ramp history for April 19, 2006, hour beginning 1900</i>	204
<i>Figure 4-24 Partial ramp history for April 19, 2006, hour beginning 1900 modified to reflect theoretical application of new rule</i>	204
<b>SECTION 5 – CAPACITY MARKET</b>	<b>207</b>
<i>Figure 5-1 Capacity obligation for the PJM Capacity Market: Calendar year 2006</i>	212
<i>Figure 5-2 PJM Capacity Market load obligation served (Percent): Calendar year 2006</i>	213
<i>Figure 5-3 External PJM Capacity Market transactions: Calendar year 2006</i>	221
<i>Figure 5-4 Internal bilateral PJM Capacity Market transactions: Calendar year 2006</i>	222
<i>Figure 5-5 PJM Daily and Monthly/Multimonthly CCM performance: Calendar year 2006</i>	225
<i>Figure 5-6 PJM Daily and Monthly/Multimonthly CCM performance: June 1999 to December 2006</i>	227
<i>Figure 5-7 PJM equivalent outage and availability factors: Calendar years 2002 to 2006</i>	229
<i>Figure 5-8 Trends in the PJM equivalent demand forced outage rate (EFORd): Calendar years 2002 to 2006</i>	230
<i>Figure 5-9 Contribution to EFORd by duty cycle: Calendar years 2002 to 2006</i>	233

**SECTION 6 – ANCILLARY SERVICE MARKETS 239**

<i>Figure 6-1 PJM Regulation Market's HHI duration curve: Calendar year 2006</i>	247
<i>Figure 6-2 PJM Regulation Market's daily average market-clearing price, lost opportunity cost and offer price: Calendar year 2006</i>	251
<i>Figure 6-3 Monthly average regulation demand (required) vs. price: Calendar year 2006</i>	252
<i>Figure 6-4 Daily average regulation charge and price: Calendar year 2006</i>	253
<i>Figure 6-5 PJM's Mid-Atlantic Tier 2 Synchronized Reserve Region's monthly required vs. purchased: Calendar year 2006</i>	256
<i>Figure 6-6 PJM's ComEd Tier 2 Synchronized Reserve Zone's monthly required vs. purchased: Calendar year 2006</i>	256
<i>Figure 6-7 Cleared Tier 2 synchronized reserve market seasonal HHI: Calendar year 2006</i>	259
<i>Figure 6-8 Tier 2 synchronized reserve average hourly eligible volume (MW): Calendar year 2006</i>	260
<i>Figure 6-9 Average daily Tier 2 synchronized reserve eligible by unit type (MW): Calendar year 2006</i>	261
<i>Figure 6-10 Comparison of PJM Tier 2 synchronized reserve price and charge: Calendar year 2006</i>	262
<i>Figure 6-11 PJM Tier 2 synchronized reserve cleared MW: Calendar year 2006</i>	263

**SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS 303**

<i>Figure 8-1 Annual FTR auction-clearing price duration curve: Planning period 2006 to 2007</i>	316
<i>Figure 8-2 Monthly FTR auction cleared buy-bid volume and average buy-bid price: Calendar years 2002 to 2006</i>	317
<i>Figure 8-3 Highest revenue producing FTR sinks purchased in the Annual FTR Auction: Planning period 2006 to 2007</i>	319
<i>Figure 8-4 Highest revenue producing FTR sources purchased in the Annual FTR Auction: Planning period 2006 to 2007</i>	320
<i>Figure 8-5 Highest revenue producing FTR sinks purchased in the monthly Balance of Planning Period FTR Auctions: Planning period 2006 to 2007 through December 31, 2006</i>	321
<i>Figure 8-6 Highest revenue producing FTR sources purchased in the monthly Balance of Planning Period FTR Auctions: Planning period 2006 to 2007 through December 31, 2006</i>	322
<i>Figure 8-7 Monthly FTR auction cleared volume and net revenue: Calendar years 2002 to 2006</i>	323
<i>Figure 8-8 Monthly FTR payout ratio: June 2005 to December 2006</i>	324
<i>Figure 8-9 Ten largest positive and negative FTR target allocations summed by sink: Planning period 2006 to 2007 through December 31, 2006</i>	325
<i>Figure 8-10 Ten largest positive and negative FTR target allocations summed by source: Planning period 2006 to 2007 through December 31, 2006</i>	326
<i>Figure 8-11 Annual FTR auction prices vs. average day-ahead and real-time congestion for all control zones relative to the Western Hub: Planning period 2006 to 2007 through December 31, 2006</i>	337

**APPENDIX A – PJM GEOGRAPHY 343**

<i>Figure A-1 PJM's footprint and its zones</i>	343
<i>Figure A-2 PJM integration phases</i>	345
<i>Figure A-3 PJM locational deliverability areas</i>	346

<b>APPENDIX C – ENERGY MARKET</b>	<b>349</b>
<i>Figure C-1 PJM real-time constrained hours: Calendar years 2005 to 2006</i>	356
<i>Figure C-2 Hourly real-time LMP minus day-ahead LMP (On-peak hours): Calendar year 2006</i>	359
<i>Figure C-3 Hourly real-time LMP minus day-ahead LMP (Off-peak hours): Calendar year 2006</i>	<b>359</b>
<i>Figure C-4 Day-ahead and real-time, market-constrained hours: Calendar year 2006</i>	362
<b>APPENDIX D – INTERCHANGE TRANSACTIONS</b>	<b>371</b>
<i>Figure D-1 Con Edison and PSE&amp;G wheel</i>	374
<b>APPENDIX F – ANCILLARY SERVICE MARKETS</b>	<b>389</b>
<i>Figure F-1 PJM CPS1 and BAAL performance: Calendar year 2006</i>	391
<i>Figure F-2 DCS event count and PJM performance (By month): Calendar year 2006</i>	392

## EQUATIONS

<b>APPENDIX G – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS</b>	<b>395</b>
<i>Equation G-1 Calculation of prorated ARRs</i>	397
<b>APPENDIX H – CALCULATING LOCATIONAL MARGINAL PRICE</b>	<b>399</b>
<i>Equation H-1 LMP calculations</i>	400
<b>APPENDIX I – GENERATOR SENSITIVITY FACTORS</b>	<b>401</b>
<i>Equation I-1 Hourly integrated load at a bus</i>	403
<i>Equation I-2 Load bus LMP</i>	403
<i>Equation I-3 Hourly integrated LMP at a bus</i>	403
<i>Equation I-4 Hourly total system cost</i>	403
<i>Equation I-5 Hourly load-weighted LMP</i>	404
<i>Equation I-6 System average annual load-weighted LMP</i>	404
<i>Equation I-7 UPF based hourly total system cost</i>	404
<i>Equation I-8 System, load-weighted LMP</i>	405
<i>Equation I-9 Cost-based offer system, hourly load-weighted LMP</i>	405
<i>Equation I-10 Impact of marginal unit markup on LMP</i>	405
<i>Equation I-11 Price-cost markup index</i>	405
<i>Equation I-12 UPF load-weighted, marginal unit markup</i>	406
<i>Equation I-13 Fuel-cost-adjusted offer</i>	407
<i>Equation I-14 Fuel-cost-adjusted, load-weighted LMP</i>	407
<i>Equation I-15 Annual systemwide, fuel-cost-adjusted, load-weighted LMP</i>	408
<i>Equation I-16 Unit historical, cost-adjusted offer</i>	408
<i>Equation I-17 Unit historical, cost-adjusted, load-weighted LMP</i>	408
<i>Equation I-18 Systemwide, historical, cost-adjusted, load-weighted LMP</i>	409
<b>APPENDIX J – THREE PIVOTAL SUPPLIER TEST</b>	<b>411</b>
<i>Equation J-1 Incremental effective MW of supply</i>	415
<i>Equation J-2 Price of clearing offer</i>	415
<i>Equation J-3 Relevant and effective offer</i>	415
<i>Equation J-4 Relevant and effective supply of supplier i</i>	415
<i>Equation J-5 Total relevant, effective supply</i>	416
<i>Equation J-6 Calculating the three pivotal supplier test</i>	416





## SECTION 1 – INTRODUCTION

The PJM Interconnection, L.L.C. operates a centrally dispatched, competitive wholesale electric power market that in 2006 had average installed generating capacity of 162,571 megawatts (MW) and more than 450 market buyers, sellers and traders of electricity in a region including more than 51 million people in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.<sup>1</sup> As part of that function, PJM coordinates and directs the operation of the transmission grid and plans transmission expansion improvements to maintain grid reliability in this region.

### **PJM Market Background**

PJM operates the Day-Ahead Energy Market, the Real-Time Energy Market, the Daily Capacity Market, the Interval, Monthly and Multimonthly Capacity Markets, the Regulation Market, the Synchronized Reserve Markets and the Annual and monthly Balance of Planning Period Auction Markets in Financial Transmission Rights (FTRs).

PJM introduced energy pricing with cost-based offers and market-clearing nodal prices on April 1, 1998, and market-clearing nodal prices with market-based offers on April 1, 1999. PJM introduced the Daily Capacity Market on January 1, 1999, and the Monthly and Multimonthly Capacity Markets in mid-1999. PJM implemented an auction-based FTR Market on May 1, 1999. PJM implemented the Day-Ahead Energy Market and the Regulation Market on June 1, 2000. PJM modified the regulation market design and added a market in spinning reserve on December 1, 2002. PJM introduced an Auction Revenue Rights (ARR) allocation process and an associated Annual FTR Auction effective June 1, 2003.<sup>2</sup>

<sup>1</sup> See *2006 State of the Market Report*, Volume II, Appendix A, "PJM Geography" for maps showing the PJM footprint and its evolution.

<sup>2</sup> See also *2006 State of the Market Report*, Volume II, Appendix B, "PJM Market Milestones."

Analysis of 2006 market results requires comparison to prior years. During calendar years 2004 and 2005, PJM integrated five new control zones. When making comparisons to 2004 and 2005, the *2006 State of the Market Report* refers to three phases in calendar year 2004 and two phases in 2005 that correspond to those integrations.<sup>3</sup>

Volume I of the *2006 State of the Market Report* is the Introduction. More detailed analysis and results are included in Volume II.

### **Conclusions**

This report assesses the competitiveness of the markets managed by PJM during 2006, including market structure, participant behavior and market performance. This report was prepared by and represents the analysis of PJM's independent Market Monitoring Unit (MMU).

The MMU concludes that in 2006:

- The Energy Market results were competitive;
- The Capacity Market results were competitive;
- The Regulation Market results cannot be determined to have been competitive or to have been noncompetitive;
- The Synchronized Reserve Markets' results were competitive; and
- The FTR Auction Market results were competitive.

<sup>3</sup> Definitions of these phases are included in the *2006 State of the Market Report*, Volume II, Appendix A, "PJM Geography."

## Recommendations

The MMU recommends retention of key market rules, specific enhancements to those rules and implementation of new rules that are required for continued competitive results in PJM markets and for continued improvements in the functioning of PJM markets. The recommendations are for continued action where PJM has already identified areas for improvement and for new action in areas where PJM has not yet identified a plan.

### Continued Action

- Retention and application of the improved local market power mitigation rules to prevent the exercise of local market power in the Energy Market while ensuring appropriate economic signals when investment is required.

PJM introduced a new test for local market power in 2006, the three pivotal supplier test. The three pivotal supplier test, as implemented, is consistent with the United States Federal Energy Regulatory Commission's (FERC's) market power tests, encompassed under the delivered price test. This is a flexible, targeted real-time measure of market structure which replaced the offer capping of all units required to relieve a constraint. The application of the three pivotal supplier test successfully limited offer capping in the Energy Market to situations where the local market structure was noncompetitive and where specific owners had structural market power.

- Retention of the \$1,000 per MWh offer cap in the PJM Energy Market and other rules that limit incentives to exercise market power.

The PJM market design includes a variety of rules that effectively limit the incentive to exercise market power and ensure competitive outcomes. These should be retained and every PJM market rule change should be evaluated for its impact on competitive outcomes.

- Implementation of the rules included in PJM's Reliability Pricing Model (RPM) Tariff to stimulate competition, to provide direct incentives for performance, to provide locational price signals, to provide forward auctions to permit competition from new entrants and to incorporate explicit market power mitigation rules.

Market power remains a serious concern in the PJM Capacity Market based on market structure conditions in this market including high levels of supplier concentration, frequent occurrences of pivotal suppliers, extreme inelasticity of demand and lack of market power mitigation measures under the market design in place during 2006. The RPM capacity market design explicitly provides that competitive prices can reflect local scarcity while not relying on the exercise of market power to achieve the design objective and explicitly limiting the exercise of market power via the application of the three pivotal supplier test.

- Enhancements to PJM's rules governing operating reserve credits to generators to ensure that credits and corresponding charges to market participants are consistent with incentives for efficient market outcomes and to reduce gaming incentives.

PJM and the MMU have been working with the Reserve Market Working Group to develop a set of market design modifications to implement these goals. The process should be completed and the modifications implemented.

- Continued enhancements to the cost-benefit analysis of congestion and transmission investments to relieve that congestion, especially where that congestion may enhance generator market power and where such investments support competition.

PJM has significantly improved its approach to the cost-benefit analysis of transmission investments. PJM should continue to evaluate critically its approach, particularly as it applies to constraints with large and persistent market impacts. Developing an approach to weighting and evaluating the multiple metrics in the context of actual transmission projects will require substantial effort. New transmission projects and the lack of existing transmission can have significant impacts on the PJM markets and the goal of transmission planning should ultimately be the incorporation of transmission investment decisions into market-driven processes as much as is practicable.

- Continued enhancement of PJM's posting of market data to promote market transparency.

PJM has expanded the types and extent of data posted to the Web for public access. PJM should continue to expand data posting consistent with the goal of improving transparency and stimulating competition.

- Provision of data for external control areas to PJM to enable improved analysis of loop flows in order to enhance the efficiency of PJM markets.

PJM has only limited access to the data required for a complete analysis of loop flow in the Eastern Interconnection. Provision of such data access and completion of the loop flow analysis could significantly enhance the transparency and efficiency of energy markets in both market and non market areas and the efficiency of transactions between market and non market areas. Loop flows have negative impacts on the efficiency of market prices in markets with explicit locational pricing and can be evidence of attempts to game such markets. Loop flows also have poorly understood impacts on non market areas.

- Evaluation of additional actions to increase demand-side responsiveness to price in both Energy and Capacity Markets and of actions to address institutional issues which may inhibit the evolution of demand-side price response.

PJM and the MMU should continue to ensure that market power is not exercised on the demand side of the market. PJM has improved the design of the demand-side resource rules. The principal barriers to the further development of demand-side response are in the interface between wholesale and retail markets. PJM and the MMU should continue their efforts in that area.

- Based on the experience of the MMU during its eighth year and its analysis of the PJM markets, the MMU recognizes the need to continue to make the market monitoring function independent, well-organized, well-defined, clear to market participants and consistent with the policy of the FERC. The MMU recommends that the Market Monitoring Plan be further modified consistent with these objectives.<sup>4</sup>

## New Action

- Enhancements to PJM's scarcity pricing rules to create stages of scarcity and corresponding stages of locational scarcity pricing in order to ensure competitive prices when scarcity conditions exist in market regions.

The MMU reviewed the summer of 2006 for scarcity conditions and the market prices that resulted. Based on the results, the MMU suggests that PJM's scarcity pricing mechanism be reviewed and modified. The definition of scarcity should include several steps or states of scarcity, each with an associated price, rather

<sup>4</sup> PJM, OATT, "Attachment M: PJM Market Monitoring Plan," Third Revised Sheet No. 452 (Effective July 17, 2006). Section VII.A. states: "The reports to the PJM Board shall include recommendations as to whether changes to the Market Monitoring Unit or the Plan are required."

than the single step now in the Tariff. Scarcity pricing should include stages, based on system conditions, with progressive impacts on prices. In addition, the actual market signal needs further refinement. Under the current rules, a scarcity pricing event sets prices for all generators in the defined area at the same level, equal to the highest accepted offer within a scarcity pricing region. The single scarcity price signal should be replaced by locational signals.

- Implementation of targeted, flexible real-time market power mitigation in the Regulation Market.

PJM consolidated its Regulation Markets into a single Combined Regulation Market, on a trial basis, effective August 1, 2005. The MMU concludes from the analysis of the 2006 data that the PJM Regulation Market in 2006 was characterized by structural market power in 26 percent of the hours, based on the results of the three pivotal supplier test.<sup>5</sup> The MMU also concludes that PJM's consolidation of its Regulation Markets resulted in improved performance and in increased competition compared to the PJM Mid-Atlantic Regulation Market or the Western Region Regulation Market on a stand-alone basis.<sup>6</sup> The MMU concludes that it would be preferable to retain the existing, experimental single PJM Regulation Market as the long-term market if appropriate mitigation can be implemented. Such mitigation, in the form of the three pivotal supplier test, addresses only the hours in which structural market power exists and therefore provides an incentive for the continued development of competition. While suppliers have not provided data on their cost to regulate, an analysis of the Regulation Market based on the MMU's cost

estimates indicates that offers above the competitive level set the clearing prices in about 30 percent of the hours. The combined market results include the effects of the current mitigation mechanism which offer caps the two dominant suppliers in every hour. The MMU also recommends that all suppliers be required to provide cost-based regulation offers, consistent with the practice in the energy market.

- Consistent application of local market power rules to all constraints.

The MMU recommends that the Commission terminate the exemption from offer capping currently applicable to generation resources used to relieve the western, central and eastern reactive limits in the Mid-Atlantic Area Council (MAAC) control zones and the AP South Interface. The MMU recommends that all constraints, including these interfaces, be subject to three pivotal supplier testing as specified in the PJM Amended and Restated Operating Agreement (OA). The exemptions for the identified interfaces are no longer necessary given PJM's dynamic implementation of the three pivotal supplier test based on actual market conditions in real time. It is not necessary to make an *ex ante* decision about the market structure associated with individual interface constraints that applies for an extended period. Prior to the implementation of the three pivotal supplier test, all units required to resolve a constraint were offer capped. For the identified exempt interfaces, this could have resulted in the offer capping of a large number of units even when the relevant market was structurally competitive. That is no longer the case. Under the current PJM dynamic approach, offer capping will be applied only as necessary and will be applied on a non-discriminatory basis for all units operating for all constraints.

<sup>5</sup> This is the same conclusion reached in the MMU report on the first year of the Combined Regulation Market. See Market Monitoring Unit, "Analysis of the Combined Regulation Market: August 1, 2005 through July 31, 2006" (October 18, 2006) <<http://www.pjm.com/markets/market-monitor/downloads/mmu-reports/20061018-mmu-regulation-market-report.pdf>> (76.1 KB).

<sup>6</sup> 2005 State of the Market Report (March 8, 2006), pp. 260-263.

- Consideration by the FERC of ending the exemption from offer capping currently applicable to certain units, if those units exercise local market power.

PJM's offer-capping rules provide that specific units are exempt from offer capping, based on their date of construction. In a January 25, 2005, order, the FERC found "that the exemption for post-1996 units from the offer capping rules is unjust and unreasonable under section 206 of the Federal Power Act and that the just and reasonable practice under section 206 is to terminate the exemption, with provisions to grandfather units for which construction commenced in reliance on the exemption."<sup>7</sup> The FERC noted, however, that grandfathered units would "still be subject to mitigation in the event that PJM or its market monitor concludes that these units exercise significant market power."<sup>8</sup> A small number of exempt units accounted for a disproportionate share of markup in 2006. Eight exempt units accounted for 33 percent of the overall markup component of PJM prices in 2006.

7 110 FERC ¶ 61,053 (2005).

8 110 FERC ¶ 61,053 (2005).

