

## TABLE OF CONTENTS

<b>PREFACE</b> .....	<b>I</b>	Markup Component of Real-Time Zonal Prices .....	16
<b>SECTION 1 - INTRODUCTION</b> .....	<b>1</b>	Markup by Real-Time System Price Levels .....	17
<i>PJM Market Background</i> .....	1	Day-Ahead Markup .....	17
<i>Conclusions</i> .....	1	Unit Markup Characteristics .....	18
<i>Role of MMU in Market Design Recommendations</i> .....	2	Markup Component of System Price .....	18
<i>Recommendations</i> .....	2	Markup Component of Zonal Prices .....	18
<i>Total Price of Wholesale Power</i> .....	2	Markup by System Price Levels .....	18
Components of Total Price .....	2	Markup Component by Fuel, Unit Type .....	19
<b>SECTION 2 – ENERGY MARKET, PART 1</b> .....	<b>5</b>	Frequently Mitigated Unit and Associated Unit Adders – Component of Price .....	19
<i>Overview</i> .....	5	<i>Market Performance: Load and LMP</i> .....	19
Market Structure .....	5	Load .....	19
Market Performance: Markup, Load and Locational Marginal Price .....	6	Locational Marginal Price (LMP) .....	22
Demand-Side Response .....	7	Load and Spot Market .....	40
Conclusion .....	8	<i>Demand-Side Response (DSR)</i> .....	42
<i>Market Structure</i> .....	9	PJM Load Response Programs Overview .....	42
Supply .....	9	Participation .....	42
Demand .....	9	<b>SECTION 3 - ENERGY MARKET, PART 2</b> .....	<b>49</b>
Market Concentration .....	10	<i>Overview</i> .....	49
Local Market Structure and Offer Capping .....	10	Net Revenue .....	49
Local Market Structure .....	11	Existing and Planned Generation .....	50
<i>Market Performance: Markup</i> .....	15	Scarcity .....	50
Real-Time Markup .....	15	Credits and Charges for Operating Reserve .....	50
Unit Markup Characteristics .....	15	Conclusion .....	51
Markup Component of System Price .....	16	<i>Net Revenue</i> .....	53



# TABLE OF CONTENTS

- Capacity Market Net Revenue . . . . . 53
- New Entrant Net Revenues . . . . . 54
- New Entrant Combustion Turbine . . . . . 55
- New Entrant Combined Cycle . . . . . 55
- New Entrant Coal Plant . . . . . 56
- New Entrant Day-Ahead Net Revenues . . . . . 57
- Net Revenue Adequacy . . . . . 59
- Existing and Planned Generation . . . . . 62*
  - Installed Capacity and Fuel Mix. . . . . 62
  - Energy Production by Fuel Source. . . . . 63
  - Planned Generation Additions . . . . . 63
- Operating Reserve . . . . . 69*
  - Credit and Charge Categories . . . . . 69
  - Credit and Charge Results. . . . . 71
  - Characteristics of Credits and Charges . . . . . 76
  - Impacts of Revised Operating Reserve Rules . . . . . 78
  - Concentration of Unit Ownership for Operating Reserve Credits. . . . . 83
  - January 3, 2010 . . . . . 84

**SECTION 4 – INTERCHANGE TRANSACTIONS . . . . . 89**

- Overview . . . . . 89*
  - Interchange Transaction Activity . . . . . 89
  - Interactions with Bordering Areas. . . . . 89
  - Interchange Transaction Issues. . . . . 92
  - Conclusion. . . . . 94
- Interchange Transaction Activity . . . . . 94*
  - Aggregate Imports and Exports. . . . . 94

- Interface Imports and Exports . . . . . 95
- Interface Pricing . . . . . 98*
- Interactions with Bordering Areas. . . . . 99*
  - PJM Interface Pricing with Organized Markets . . . . . 99
  - Operating Agreements with Bordering Areas . . . . . 103
- Interchange Transaction Issues . . . . . 104*
  - Loop Flows . . . . . 104
  - TLRs . . . . . 105
  - Up-To Congestion . . . . . 106
  - Interface Pricing Agreements with Individual Companies. . . . . 107
  - Spot Import . . . . . 109
  - Willing to Pay Congestion and Not Willing to Pay Congestion . . . . . 110
  - Ramp Availability. . . . . 110

**SECTION 5 – CAPACITY MARKET . . . . . 111**

- Overview . . . . . 111*
  - RPM Capacity Market . . . . . 111
  - Generator Performance . . . . . 114
  - Conclusion. . . . . 115
- RPM Capacity Market . . . . . 116*
  - Market Structure . . . . . 116
  - Market Conduct. . . . . 119
  - Market Performance . . . . . 123
- Generator Performance . . . . . 128*
  - Generator Performance Factors. . . . . 128
  - Generator Forced Outage Rates. . . . . 129

**SECTION 6 - ANCILLARY SERVICE MARKETS . . . . . 135**

*Overview* . . . . . 135

    Regulation Market . . . . . 135

    Synchronized Reserve Market . . . . . 137

    DASR . . . . . 138

    Black Start Service . . . . . 138

    Conclusion . . . . . 139

*Regulation Market* . . . . . 140

    Market Structure . . . . . 140

    Market Performance . . . . . 141

    Analysis of Regulation Market Changes . . . . . 142

*Synchronized Reserve Market* . . . . . 146

    Market Structure . . . . . 146

    Market Conduct . . . . . 147

    Market Performance . . . . . 149

*Day Ahead Scheduling Reserve (DASR)* . . . . . 150

*Black Start Service* . . . . . 151

**SECTION 7 – CONGESTION . . . . . 153**

*Overview* . . . . . 153

    Congestion Cost . . . . . 153

    Congestion Component of LMP and Facility or Zonal Congestion . . . . . 153

    Economic Planning Process . . . . . 154

    Conclusion . . . . . 155

*Congestion* . . . . . 156

    Total Calendar Year Congestion . . . . . 156

    Monthly Congestion . . . . . 156

    Congestion Component of LMP . . . . . 157

*Congested Facilities* . . . . . 157

    Congestion by Facility Type and Voltage . . . . . 157

    Constraint Duration . . . . . 160

    Constraint Costs . . . . . 162

    Congestion-Event Summary for Midwest ISO Flowgates . . . . . 164

    Congestion-Event Summary for the 500 kV System . . . . . 166

*Zonal Congestion* . . . . . 167

    Summary . . . . . 167

    Details of Regional and Zonal Congestion . . . . . 169

**SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS . . . . . 203**

*Overview* . . . . . 203

    Financial Transmission Rights . . . . . 203

    Auction Revenue Rights . . . . . 204

    Conclusion . . . . . 205

*Financial Transmission Rights* . . . . . 205

    Patterns of Ownership . . . . . 205

    Market Performance . . . . . 206

*Auction Revenue Rights* . . . . . 210

    Market Structure . . . . . 210

    Market Performance . . . . . 211



## TABLES

### SECTION 1 - INTRODUCTION..... 1

Table 1-1 Total price per MWh: January through March 2010  
(See 2009 SOM, Table 1-1) ..... 3

### SECTION 2 – ENERGY MARKET, PART 1 ..... 5

Table 2-1 Actual PJM footprint peak loads: January through March of 2003 to 2010 (See 2009 SOM, Table 2-1) ..... 9

Table 2-2 PJM hourly Energy Market HHI: January through March 2010  
(See 2009 SOM, Table 2-2) ..... 10

Table 2-3 PJM hourly Energy Market HHI (By segment): January through March 2010 (See 2009 SOM, Table 2-3) ..... 10

Table 2-4 Annual real-time offer-capping statistics: Calendar years 2006 through March 2010 (See 2009 SOM, Table 2-4) ..... 10

Table 2-5 Real-time offer-capped unit statistics: January through March 2010  
(See 2009 SOM, Table 2-5) ..... 11

Table 2-6 Three pivotal supplier results summary for regional constraints: January through March 2010 (See 2009 SOM, Table 2-6) ..... 11

Table 2-7 Three pivotal supplier test details for three regional constraints: January through March 2010 (See 2009 SOM, Table 2-7) ..... 11

Table 2-8 Three pivotal supplier results summary for constraints located in the AEP Control Zone: January through March 2010 (See 2009 SOM, Table 2-12) ..... 11

Table 2-9 Three pivotal supplier test details for constraints located in the AEP Control Zone: January through March 2010 (See 2009 SOM, Table 2-13) ..... 12

Table 2-10 Three pivotal supplier results summary for constraints located in the AP Control Zone: January through March 2010 (See 2009 SOM, Table 2-14) ..... 12

Table 2-11 Three pivotal supplier test details for constraints located in the AP Control Zone: January through March 2010 (See 2009 SOM, Table 2-15) ..... 12

Table 2-12 Three pivotal supplier results summary for constraints located in the BGE Control Zone: January through March 2010 (See 2009 SOM, Table 2-16) ..... 12

Table 2-13 Three pivotal supplier test details for constraints located in the BGE Control Zone: January through March 2010 (See 2009 SOM, Table 2-17) ..... 13

Table 2-14 Three pivotal supplier results summary for constraints located in the ComEd Control Zone: January through March 2010 (See 2009 SOM, Table 2-18) ..... 13

Table 2-15 Three pivotal supplier test details for constraints located in the ComEd Control Zone: January through March 2010 (See 2009 SOM, Table 2-19) ..... 13

Table 2-16 Three pivotal supplier results summary for constraints located in the DLCO Control Zone: January through March 2010 (See 2009 SOM, Table 2-20) ..... 13

Table 2-17 Three pivotal supplier test details for constraints located in the DLCO Control Zone: January through March 2010 (See 2009 SOM, Table 2-21) ..... 14

Table 2-18 Three pivotal supplier results summary for constraints located in the Dominion Control Zone: January through March 2010 (See 2009 SOM, Table 2-22) ..... 14

Table 2-19 Three pivotal supplier test details for constraints located in the Dominion Control Zone: January through March 2010 (See 2009 SOM, Table 2-23) ..... 14

Table 2-20 Three pivotal supplier results summary for constraints located in the PSEG Control Zone: January through March 2010 (See 2009 SOM, Table 2-30) ..... 14

Table 2-21 Three pivotal supplier test details for constraints located in the PSEG Control Zone: January through March 2010 (See 2009 SOM, Table 2-31) ..... 14

Table 2-22 Marginal unit contribution to PJM real-time, annual, load-weighted LMP (By parent company): January through March 2010 (See 2009 SOM, Table 2-32) ..... 15

Table 2-23 Type of fuel used (By real-time marginal units): January through March 2010 (See 2009 SOM, Table 2-33) ..... 15

Table 2-24 The markup component of the overall PJM real-time, load-weighted, average LMP by primary fuel type and unit type: January through March 2010 (See 2009 SOM, Table 2-34) ..... 15

Table 2-25 Average, real-time marginal unit markup index (By price category): January through March 2010 (See 2009 SOM, Table 2-35) ..... 16

Table 2-26 Monthly markup components of real-time load-weighted LMP: January through March 2010 (See 2009 SOM, Table 2-36) ..... 16

Table 2-27 Average real-time zonal markup component: January through March 2010 (See 2009 SOM, Table 2-37) ..... 16

Table 2-28 Average real-time markup component (By price category): January through March 2010 (See 2009 SOM, Table 2-38) ..... 17

Table 2-29 Marginal unit contribution to PJM day-ahead, annual, load-weighted LMP (By parent company): January through March 2010 (See 2009 SOM, Table 2-39) ..... 17

Table 2-30 Day-ahead marginal resources by type/fuel: January through March 2010 (See 2009 SOM, Table 2-40) ..... 17

Table 2-31 Average, day-ahead marginal unit markup index (By primary fuel and unit type): January through March 2010 (See 2009 SOM, Table 2-41) ..... 18

Table 2-32 Average, day-ahead marginal unit markup index (By price category): January through March 2010 (See 2009 SOM, Table 2-42) ..... 18

Table 2-33 Monthly markup components of day-ahead, load-weighted LMP: January through March 2010 (See 2009 SOM, Table 2-43) ..... 18

Table 2-34 Day-ahead, average, zonal markup component: January through March 2010 (See 2009 SOM, Table 2-44) ..... 18

Table 2-35 Average, day-ahead markup (By price category): January through March 2010 (See 2009 SOM, Table 2-45) ..... 18

Table 2-36 Markup component of the overall PJM day-ahead, load-weighted, average LMP by primary fuel type and unit type: January through March 2010 (See 2009 SOM, Table 2-46) ..... 19

Table 2-37 Frequently mitigated units and associated units (By month): January through March 2010 (See 2009 SOM, Table 2-47) ..... 19



Table 2-38 Frequently mitigated units and associated units total months eligible: January through March 2010 (See 2009 SOM, Table 2-48) . . . . . 19

Table 2-39 PJM real-time average load: Calendar years 1998 through March 2010 (See 2009 SOM, Table 2-49) . . . . . 20

Table 2-40 PJM annual Summer THI, Winter WWP and average temperature: cooling, heating and shoulder months of 2006 through March 2010 (See 2009 SOM, Table 2-51) . . . . . 20

Table 2-41 PJM day-ahead average load: Calendar years 2000 through March 2010 (See 2009 SOM, Table 2-52) . . . . . 21

Table 2-42 Cleared day-ahead and real-time load (MWh): January through March 2010 (See 2009 SOM, Table 2-53) . . . . . 21

Table 2-43 Day-ahead and real-time generation (MWh): January through March 2010 (See 2009 SOM, Table 2-54) . . . . . 22

Table 2-44 PJM real-time, simple average LMP (Dollars per MWh): Calendar years 1998 through March 2010 (See 2009 SOM, Table 2-55) . . . . . 23

Table 2-45 Zonal real-time, simple average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-56) . . . . . 23

Table 2-46 Jurisdiction real-time, simple average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-57) . . . . . 24

Table 2-47 Hub real-time, simple average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-58) . . . . . 24

Table 2-48 PJM real-time, annual, load-weighted, average LMP (Dollars per MWh): Calendar years 1998 through March 2010 (See 2009 SOM, Table 2-59) . . . . . 24

Table 2-49 Zonal real-time, annual, load-weighted, average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-60) . . . . . 25

Table 2-50 Jurisdiction real-time, annual, load-weighted, average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-61) . . . . . 26

Table 2-51 RGGI CO<sub>2</sub> allowance auction prices and quantities: 2009-2011 Compliance Period (See 2009 SOM, Table 2-62) . . . . . 26

Table 2-52 PJM real-time annual, fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): January 1, 2010, through March 31, 2010 (See 2009 SOM, Table 2-63) . . . . . 27

Table 2-53 Components of PJM real-time, annual, load-weighted, average LMP: January 1, 2010, through March 31, 2010 (See 2009 SOM, Table 2-64) . . . . . 27

Table 2-54 PJM day-ahead, simple average LMP (Dollars per MWh): Calendar years 2000 through March 2010 (See 2009 SOM, Table 2-65) . . . . . 27

Table 2-55 Zonal day-ahead, simple average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-66) . . . . . 28

Table 2-56 Jurisdiction day-ahead, simple average LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-67) . . . . . 28

Table 2-57 PJM day-ahead, load-weighted, average LMP (Dollars per MWh): Calendar years 2000 through March 2010 (See 2009 SOM, Table 2-68) . . . . . 29

Table 2-58 Zonal day-ahead, load-weighted, average LMP (Dollars per MWh): January through March 2009 to 2010 (See 2009 SOM, Table 2-69) . . . . . 29

Table 2-59 Jurisdiction day-ahead, load weighted LMP (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-70) . . . . . 30

Table 2-60 Components of PJM day-ahead, annual, load-weighted, average LMP (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-71) . . . . . 30

Table 2-61 PJM real-time, simple average LMP components (Dollars per MWh): Calendar years 2006 through March 2010 (See 2009 SOM, Table 2-72) . . . . . 30

Table 2-62 Zonal real-time, simple average LMP components (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-73) . . . . . 31

Table 2-63 Hub real-time, simple average LMP components (Dollars per MWh): January through March 2010 (See 2009 SOM, 2-74) . . . . . 31

Table 2-64 Zonal and PJM real-time, annual, load-weighted, average LMP components (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-75) . . . . . 32

Table 2-65 PJM day-ahead, simple average LMP components (Dollars per MWh): Calendar years 2006 through March 2010 (See 2009 SOM, Table 2-76) . . . . . 32

Table 2-66 Zonal day-ahead, simple average LMP components (Dollars per MWh): January through March 2009 and 2010 (See 2009 SOM, Table 2-77) . . . . . 33

Table 2-67 Zonal and PJM day-ahead, load-weighted, average LMP components (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-78) . . . . . 34

Table 2-68 Marginal loss costs by type (Dollars (Millions)): January through March 2010 (See 2009 SOM, Table 2-79) . . . . . 34

Table 2-69 Marginal loss costs by control zone and type (Dollars (Millions)): January through March 2010 (See 2009 SOM, Table 2-80) . . . . . 35

Table 2-70 Monthly marginal loss costs by control zone (Dollars (Millions)): January through March 2010 (See 2009 SOM, Table 2-81) . . . . . 36

Table 2-71 Monthly volume of cleared and submitted INCs, DECIs: January through March 2010 (See 2009 SOM, Table 2-82) . . . . . 36

Table 2-72 Type of day-ahead marginal units: January through March 2010 (See 2009 SOM, Table 2-83) . . . . . 36

Table 2-73 PJM virtual bids by type of bid parent organization (MW): January through March 2010 (See 2009 SOM, Table 2-84) . . . . . 37

Table 2-74 PJM virtual bids by top ten locations (MW): January through March 2010 (See 2009 SOM, Table 2-85) . . . . . 37

Table 2-75 Day-ahead and real-time simple annual average LMP (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-86) . . . . . 37

Table 2-76 Day-ahead and real-time simple annual average LMP (Dollars per MWh): Calendar years 2000 through March 2010 (See 2009 SOM, Table 2-87) . . . . . 38

Table 2-77 Frequency distribution by hours of PJM real-time and day-ahead load-weighted hourly LMP difference (Dollars per MWh): Calendar years 2006 through March 2010 (See 2009 SOM, Table 2-88) . . . . . 38

Table 2-78 Zonal day-ahead and real-time simple annual average LMP (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-89) . . . . . 39

Table 2-79 Jurisdiction day-ahead and real-time simple annual average LMP (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 2-90) . . . . . 40

Table 2-80 Monthly average percentage of real-time self-supply load, bilateral-supply load and spot-supply load based on parent companies: Calendar years 2009 to March 31, 2010 (See 2009 SOM, Table 2-91) . . . . . 40

Table 2-81 Monthly average percentage of day-ahead self-supply load, bilateral supply load, and spot-supply load based on parent companies: Calendar years 2009 to March 31, 2010 (See 2009 SOM, Table 2-92) . . . . . 41

Table 2-82 Overview of Demand Side Programs (See 2009 SOM, Table 2-93) . . . . . 42

Table 2-83 Economic Program registration on peak load days: Calendar years 2002 to 2009 and January through March 2010 (See 2009 SOM, Table 2-94) . . . . .	42	Table 3-11 Real-time PJM average net revenue for a CP under peak-hour, economic dispatch by market (Dollars per installed MW-year): January through March 2010 (See 2009 SOM, Table 3-13) . . . . .	56
Table 2-84 Economic Program registrations on the last day of the month: January 2007 through March 2010 (See 2009 SOM, Table 2-95) . . . . .	43	Table 3-12 Real-time zonal combined net revenue from all markets for a CP under peak-hour, economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-14) . . . . .	56
Table 2-85 Distinct registrations and sites in the Economic Program: January 4, 2010 (See 2009 SOM, Table 2-96) . . . . .	43	Table 3-13 PJM Day-Ahead Energy Market net revenue for a new entrant gas-fired CT under economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-15) . . . . .	57
Table 2-86 PJM Economic Program by zonal reduction: January through March 2010 (See 2009 SOM, Table 2-99) . . . . .	44	Table 3-14 PJM Day-Ahead Energy Market net revenue for a new entrant gas-fired CC under economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-16) . . . . .	57
Table 2-87 Settlement days submitted by month in the Economic Program: January 2007 through March 2010 (See 2009 SOM, Table 2-100) . . . . .	45	Table 3-15 PJM Day-Ahead Energy Market net revenue for a new entrant CP under economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-17) . . . . .	58
Table 2-88 Distinct customers and CSPs submitting settlements in the Economic Program by month: January 2007 through March 2010 (See 2009 SOM, Table 2-101) . . . . .	45	Table 3-16 Real-Time and Day-Ahead Energy Market net revenues for a CT under economic dispatch (Dollars per installed MW-year): Calendar year 2000 to 2009 and January through March 2010 (See 2009 SOM, Table 3-18) . . . . .	58
Table 2-89 Hourly distribution of Economic Program MWh reductions and credits: January through March 2010 (See 2009 SOM, Table 2-102) . . . . .	46	Table 3-17 Real-Time and Day-Ahead Energy Market net revenues for a CC under economic dispatch scenario (Dollars per installed MW-year): Calendar year 2000 to 2009 and January through March 2010 (See 2009 SOM, Table 3-19) . . . . .	58
Table 2-90 Distribution of Economic Program zonal, load-weighted, average LMP (By hours): January through March 2010 (See 2009 SOM, Table 2-103) . . . . .	47	Table 3-18 Real-Time and Day-Ahead Energy Market net revenues for a CP under economic dispatch scenario (Dollars per installed MW-year): Calendar year 2000 to 2009 and January through March 2010 (See 2009 SOM, Table 3-20) . . . . .	59
Table 2-91 Registered sites and MW in the Emergency Program (By zone and option): January 4, 2010 (See 2009 SOM, Table 2-104) . . . . .	47	Table 3-19 New entrant 20-year levelized fixed costs (By plant type (Dollars per installed MW-year)) (See 2009 SOM, Table 3-21) . . . . .	59
<b>SECTION 3 - ENERGY MARKET, PART 2 . . . . .</b>	<b>49</b>	Table 3-20 CT 20-year levelized fixed cost vs. real-time economic dispatch, zonal net revenue (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-23) . . . . .	59
Table 3-1 2010 PJM RPM auction-clearing capacity price and capacity revenue by LDA and zone: Effective for January 1, through December 31, 2010 (See 2009 SOM, Table 3-3) . . . . .	53	Table 3-21 CC 20-year levelized fixed cost vs. real-time economic dispatch, zonal net revenue (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-25) . . . . .	60
Table 3-2 Capacity revenue by PJM zones (Dollars per MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-4) . . . . .	53	Table 3-22 CP 20-year levelized fixed cost vs. real-time economic dispatch, zonal net revenue (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-27) . . . . .	61
Table 3-3 Average delivered fuel price in PJM (Dollars per MBtu): January through March 2009 and 2010 (See 2009 SOM, Table 3-5) . . . . .	54	Table 3-23 PJM installed capacity (By fuel source): January 1, January 31, February 28, and March 31, 2010 (See 2009 SOM, Table 3-35) . . . . .	62
Table 3-4 PJM Real-Time Energy Market net revenue for a new entrant gas-fired CT under economic dispatch (Dollars per installed MW-year): Net revenue for January through March 2009 and 2010 (See 2009 SOM, Table 3-6) . . . . .	54	Table 3-24 PJM generation (By fuel source (GWh)): January through March 2010 (See 2009 SOM, Table 3-36) . . . . .	63
Table 3-5 PJM Real-Time Energy Market net revenue for a new entrant gas-fired CC under economic dispatch (Dollars per installed MW-year): Net revenue for January through March 2009 and 2010 (See 2009 SOM, Table 3-7) . . . . .	54	Table 3-25 Year-to-year capacity additions from PJM generation queue: Calendar years 2000 through March 2010 (See 2009 SOM, Table 3-37) . . . . .	63
Table 3-6 PJM Real-Time Energy Market net revenue for a new entrant CP under economic dispatch (Dollars per installed MW-year): Net revenue for January through March 2009 and 2010 (See 2009 SOM, Table 3-8) . . . . .	55	Table 3-26 Queue comparison (MW): March 31, 2010 vs. December 31, 2009 (See 2009 SOM, Table 3-38) . . . . .	63
Table 3-7 Real-time PJM average net revenue for a CT under peak-hour, economic dispatch by market (Dollars per installed MW-year): January through March 2010 (See 2009 SOM, Table 3-9) . . . . .	55	Table 3-27 Capacity in PJM queues (MW): At March 31, 2010 (See 2009 SOM, Table 3-39) . . . . .	64
Table 3-8 Real-time zonal combined net revenue from all markets for a CT under peak-hour, economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-10) . . . . .	55	Table 3-28 Average project queue times: At March 31, 2010 (See 2009 SOM, Table 3-40) . . . . .	64
Table 3-9 Real-time PJM average net revenue for a CC under peak-hour, economic dispatch by market (Dollars per installed MW-year): January through March 2010 (See 2009 SOM, Table 3-11) . . . . .	55		
Table 3-10 Real-time zonal combined net revenue from all markets for a CC under peak-hour, economic dispatch (Dollars per installed MW-year): January through March 2009 and 2010 (See 2009 SOM, Table 3-12) . . . . .	56		



Table 3-29 Capacity additions in active or under-construction queues by control zone (MW): At March 31, 2010 (See 2009 SOM, Table 3-41) . . . . . 64

Table 3-30 Capacity additions in active or under-construction queues by LDA (MW): At March 31, 2010 (See 2009 SOM, Table 3-42) . . . . . 64

Table 3-31 Existing PJM capacity: At March 31, 2010 (By zone and unit type (MW)) (See 2009 SOM, Table 3-43) . . . . . 65

Table 3-32 PJM capacity age: At March 31, 2010 (MW) (See 2009 SOM, Table 3-44) . . . . . 66

Table 3-33 Comparison of generators 40 years and older with slated capacity additions (MW): Through 2018 (See 2009 SOM, Table 3-45) . . . . . 66

Table 3-34 Capacity factor of wind units in PJM, January through March 2010 (See 2009 SOM, Table 3-46) . . . . . 68

Table 3-35 Wind resources in real time offering at a negative price in PJM, January through March 2010 (See 2009 SOM, Table 3-47) . . . . . 68

Table 3-36 Capacity factor of wind units in PJM by month, January through March 2010 (See 2009 SOM, Table 3-48) . . . . . 68

Table 3-37 Peak and off-peak seasonal capacity factor, average wind generation, and PJM load, January through March 2010 (See 2009 SOM, Table 3-49) . . . . 68

Table 3-38 Operating reserve credits and charges (See 2009 SOM, Table 3-50) . . . . 69

Table 3-39 Operating reserve deviations (See 2009 SOM, Table 3-51) . . . . . 70

Table 3-40 Balancing operating reserve allocation process (See 2009 SOM, Table 3-52) . . . . . 70

Table 3-41 Monthly operating reserve charges: Calendar year 2009 and January through March 2010 (See 2009 SOM, Table 3-54) . . . . . 71

Table 3-42 Regional balancing charges allocation: January through March 2010 (See 2009 SOM, Table 3-55) . . . . . 72

Table 3-43 Monthly balancing operating reserve deviations (MWh): Calendar year 2009 and January through March 2010 (See 2009 SOM, Table 3-56) . . . . 73

Table 3-44 Regional charges determinants (MWh): January through March 2010 (See 2009 SOM, Table 3-57) . . . . . 74

Table 3-45 Regional balancing operating reserve rates (\$/MWh): January through March 2010 (See 2009 SOM, Table 3-58) . . . . . 75

Table 3-46 Credits by month (By operating reserve market): January through March 2010 (See 2009 SOM, Table 3-59) . . . . . 75

Table 3-47 Credits by unit types (By operating reserve market): January through March 2010 (See 2009 SOM, Table 3-60) . . . . . 76

Table 3-48 Credits by operating reserve market (By unit type): January through March 2010 (See 2009 SOM, Table 3-61) . . . . . 76

Table 3-49 Monthly balancing operating reserve charges and credits to generators (By location): January through March 2010 (See 2009 SOM, Table 3-65) . . . . . 77

Table 3-50 Regional balancing operating reserve credits: January through March 2010 (See 2009 SOM, Table 3-66) . . . . . 78

Table 3-51 Total deviations: January through March 2010 (See 2009 SOM, Table 3-67) . . . . . 78

Table 3-52 Charge allocation under old operating reserve construct: January through March 2010 (See 2009 SOM, Table 3-68) . . . . . 78

Table 3-53 Actual regional credits, charges, rates and charge allocation (MWh): January through March 2010 (See 2009 SOM, Table 3-69) . . . . . 78

Table 3-54 Difference in total charges between old rules and new rules: January through March 2010 (See 2009 SOM, Table 3-70) . . . . . 79

Table 3-55 Total virtual bids and amount of virtual bids paying balancing operating charges (MWh): January through March 2010 (see 2009 SOM, Table 3-71) . . . . . 79

Table 3-56 Comparison of balancing operating reserve charges to virtual bids: January through March 2010 (See 2009 SOM, Table 3-72) . . . . . 79

Table 3-57 Summary of impact on virtual bids under balancing operating reserve allocation: January through March 2010 (See 2009 SOM, Table 3-73) . . . . . 80

Table 3-58 Impact of segmented make whole payments: December 2008 through March 2010 (See 2009 SOM, Table 3-74) . . . . . 80

Table 3-59 Impact of segmented make whole payments (By unit type): January through March 2010 (See 2009 SOM, Table 3-75) . . . . . 81

Table 3-60 Share of balancing operating reserve increases for segmented make whole payments (By unit type): January through March 2010 (See 2009 SOM, Table 3-76) . . . . . 81

Table 3-61 Unit Parameter Limited Schedule Matrix (See 2009 SOM, Table 3-77) . . . . . 82

Table 3-62 Units receiving credits from a parameter limited schedule: January through March 2010 (See 2009 SOM, Table 3-78) . . . . . 82

Table 3-63 Unit operating reserve credits for units (By zone): January through March 2010 (See 2009 SOM, Table 3-80) . . . . . 83

Table 3-64 Top 10 units and organizations receiving total operating reserve credits: January through March 2010 (See 2009 SOM, Table 3-81) . . . . . 83

Table 3-65 Top 10 units and organizations receiving day-ahead generator credits: January through March 2010 (See 2009 SOM, Table 3-82) . . . . . 83

Table 3-66 Top 10 units and organizations receiving synchronous condensing credits: January through March 2010 (See 2009 SOM, Table 3-83) . . . . . 84

Table 3-67 Top 10 units and organizations receiving balancing generator credits: January through March 2010 (See 2009 SOM, Table 3-84) . . . . . 84

Table 3-68 Top 10 units and organizations receiving lost opportunity cost credits: January through March 2010 (See 2009 SOM, Table 3-85) . . . . . 84

Table 3-69 Regional Credits, Charges, and Deviations Breakdown: January 3, 2010 (New Table) . . . . . 87

Table 3-70 Credits by unit types (By operating reserve market): January 3, 2010 (New Table) . . . . . 87

Table 3-71 Credits by operating reserve market (By unit type): January 3, 2010 (New Table) . . . . . 87

Table 3-72 Top 10 units receiving operating reserve credits: January 3, 2010 (New Table) . . . . . 88

**SECTION 4 – INTERCHANGE TRANSACTIONS . . . . . 89**

Table 4-1 Real-time scheduled net interchange volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-1) . . . . . 95

Table 4-2 Real-time scheduled gross import volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-2) . . . . . 96

Table 4-3 Real-time scheduled gross export volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-3) . . . . . 96



Table 4-4 Day-ahead net interchange volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-4). . . . . 97

Table 4-5 Day-ahead gross import volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-5). . . . . 97

Table 4-6 Day-ahead gross export volume by interface (GWh): January through March 2010 (See 2009 SOM, Table 4-6). . . . . 98

Table 4-7 Active interfaces: January through March 2010 (See 2009 SOM, Table 4-7). . . . . 98

Table 4-8 Active pricing points: January through March 2010 (See 2009 SOM, Table 4-8). . . . . 99

Table 4-9 Average real-time LMP difference (PJM minus Midwest ISO): January 1, 2008 through March 31, 2010 (See 2009 SOM, Table 4-9). . . . . 100

Table 4-10 Average day-ahead LMP difference (PJM minus Midwest ISO): January 1, 2008 through March 31, 2010 (See 2009 SOM, Table 4-10). . . . . 101

Table 4-11 Con Edison and PSE&G wheeling settlement data: January through March 2010 (See 2009 SOM, Table 4-11) . . . . . 103

Table 4-12 Net scheduled and actual PJM interface flows (GWh): January through March 2010 (See 2009 SOM, Table 4-12) . . . . . 104

Table 4-13 Number of TLRs by TLR level by reliability coordinator: January through March 2010 (See 2009 SOM, Table 4-13). . . . . 106

Table 4-14 Up-to congestion MW by Import, Export and Wheels: January 2006 through March 2010 (See 2009 SOM, Table 4-14) . . . . . 106

Table 4-15 Real-time average hourly LMP comparison for southeast, southwest, SouthIMP and SouthEXP Interface pricing points: November 1, 2006 through March 2010 (See 2009 SOM, Table 4-15). . . . . 107

Table 4-16 Real-time average hourly LMP comparison for Duke, PEC and NCMPA: January through March 2010 (See 2009 SOM, Table 4-17). . . . . 108

Table 4-17 Day-ahead average hourly LMP comparison for Duke, PEC and NCMPA: January through March 2010 (See 2009 SOM, Table 4-19). . . . . 108

**SECTION 5 – CAPACITY MARKET . . . . . 111**

Table 5-1 Internal capacity: June 1, 2008, to June 1, 2012 (See 2009 SOM, Table 5-1). . . . . 116

Table 5-2 PJM Capacity Market load obligation served: June 1, 2009 (See 2009 SOM, Table 5-2) . . . . . 117

Table 5-3 Preliminary market structure screen results: 2009/2010 through 2013/2014 RPM Auctions (See 2009 SOM, Table 5-3) . . . . . 117

Table 5-4 RSI results: 2009/2010 through 2012/2013 RPM Auctions (See 2009 SOM, Table 5-4) . . . . . 118

Table 5-5 PJM capacity summary (MW): June 1, 2007, to June 1, 2012 (See 2009 SOM, Table 5-5) . . . . . 118

Table 5-6 RPM load management statistics: June 1, 2008 to June 1, 2012 (See 2009 SOM, Table 5-6) . . . . . 119

Table 5-7 ACR statistics: 2009/2010 RPM Auctions (See 2009 SOM, Table 5-7). . . . . 119

Table 5-8 ACR statistics: 2010/2011 through 2012/2013 RPM Auctions (See 2009 SOM, Table 5-8) . . . . . 120

Table 5-9 APIR statistics: 2009/2010 through 2012/2013 RPM Auctions (See 2009 SOM, Table 5-9) . . . . . 121

Table 5-10 Capacity prices: 2007/2008 through 2012/2013 RPM Auctions (See 2009 SOM, Table 5-10) . . . . . 123

Table 5-11 RPM cost to load: 2009/2010 through 2012/2013 RPM Auctions (See 2009 SOM, Table 5-11) . . . . . 123

Table 5-12 RTO offer statistics: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Table 5-12) . . . . . 124

Table 5-13 MAAC+APS offer statistics: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Table 5-13) . . . . . 125

Table 5-14 SWMAAC offer statistics: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Table 5-14). . . . . 126

Table 5-15 RTO offer statistics: 2009/2010 RPM Third Incremental Auction (See 2009 SOM, Table 5-15). . . . . 127

Table 5-16 MAAC+APS offer statistics: 2009/2010 RPM Third Incremental Auction (See 2009 SOM, Table 5-16). . . . . 128

Table 5-17 Five-year PJM EFORd data comparison to NERC five-year average for different unit types: Calendar years 2006 to 2010 (January through March) (See 2009 SOM, Table 5-17) . . . . . 129

Table 5-18 Contribution to EFORd for specific unit types (Percentage points): Calendar years 2006 to 2010 (January through March) (See 2009 SOM, Table 5-18). . . . . 129

Table 5-19 Outage cause contribution to PJM EFOF: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-19) . . . . . 130

Table 5-20 Contributions to Economic Outages: 2010 (January through March) (See 2009 SOM, Table 5-20) . . . . . 131

Table 5-21 Contribution to EFOF by unit type for the most prevalent causes: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-21). . . 131

Table 5-22 Contribution to EFOF by unit type: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-22). . . . . 132

Table 5-23 PJM EFORd vs. XEFORd: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-23) . . . . . 132

Table 5-24 Contribution to EFORp by unit type (Percentage points): Calendar years 2009 to 2010 (January through March) (See 2009 SOM, Table 5-24). . . 132

Table 5-25 PJM EFORp data by unit type: Calendar years 2009 to 2010 (January through March) (See 2009 SOM, Table 5-25) . . . . . 132

Table 5-26 Contribution to PJM EFORd, XEFORd and EFORp by unit type: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-26). . . 133

Table 5-27 PJM EFORd, XEFORd and EFORp data by unit type: Calendar year 2010 (January through March) (See 2009 SOM, Table 5-27) . . . . . 133

**SECTION 6 - ANCILLARY SERVICE MARKETS . . . . . 135**

Table 6-1 PJM Regulation Market required MW and ratio of supply to requirement: January through March 2010 (See 2009 SOM, Table 6-1) . . . . . 140

Table 6-2 PJM regulation capability, daily offer and hourly eligible: January through March 2010 (See 2009 SOM, Table 6-2). . . . . 140

Table 6-3 PJM cleared regulation HHI: January through March 2010 (See 2009 SOM, Table 6-3). . . . . 140

Table 6-4 Highest annual average hourly Regulation Market shares: January through March 2010 (See 2009 SOM, Table 6-4). . . . . 141

Table 6-5 Regulation market monthly three pivotal supplier results: January through March 2010 (See 2009 SOM, Table 6-5).	141
Table 6-6 Percent of hours when marginal unit supplier was pivotal: January through March 2010 (See 2009 SOM, Table 6-6).	141
Table 6-7 Total regulation charges: January through March 2010 (See 2009 SOM, Table 6-7).	142
Table 6-8 Summary of changes to Regulation Market design (See 2009 SOM, Table 6-8).	142
Table 6-9 Regulation Market pivotal supplier test results: December 2008 through March 2010 and December 2007 through March 2009 (See 2009 SOM, Table 6-9).	143
Table 6-10 Impact of \$12 adder to cost based regulation offer: January through March 2010 (See 2009 SOM, Table 6-10).	143
Table 6-11 Impact to Regulation Market Clearing Price of using lesser of price based energy schedule or most expensive cost-based energy schedule: January through March 2010 (See 2009 SOM, Table 6-11).	144
Table 6-12 Additional credits paid to regulating units from no longer netting credits above RMCP against operating reserves: January through March 2010 (See 2009 SOM, Table 6-12).	144
Table 6-13 Summary of additional charges paid as a result of December 1, 2008 changes to Regulation Market rules: January through March 2010, including December 2008 through December 2009 totals (See 2009 SOM, Table 6-13).	145
Table 6-14 Mid-Atlantic Subzone RFC Tier 2 Synchronized Reserve Market's cleared market shares: January through March 2010 (See 2009 SOM, Table 6-15).	147
Table 6-15 Average RFC SRMCP when all cleared synchronized reserve is DSR, average SRMCP, and percent of all cleared hours that all cleared synchronized reserve is DSR: January through March 2010 (See 2009 SOM, Table 6-16).	148
Table 6-16 2009 PJM, Day-Ahead Scheduling Reserve Market MW and clearing prices: January through March 2010 (See 2009 SOM, Table 6-17)	150
Table 6-17 Black Start yearly zonal charges for network transmission use: January through March 2010 (See 2009 SOM, Table 6-18).	151

## **SECTION 7 – CONGESTION . . . . . 153**

Table 7-1 Total annual PJM congestion (Dollars (Millions)): Calendar years 2003 through March 2010 (See 2009 SOM, Table 7-1)	156
Table 7-2 Total annual PJM congestion costs by category (Dollars (Millions)): January through March 2009 and 2010 (See 2009 SOM, Table 7-2)	156
Table 7-3 Monthly PJM congestion charges (Dollars (Millions)): Calendar years 2008 through March 2010 (See 2009 SOM, Table 7-3)	156
Table 7-4 Annual average congestion component of LMP: January through March 2009 and 2010 (See 2009 SOM, Table 7-4)	157
Table 7-5 Congestion summary (By facility type): January through March 2010 (See 2009 SOM, Table 7-5)	157
Table 7-6 Congestion summary (By facility type): January through March 2009 (See 2009 SOM, Table 7-6).	158
Table 7-7 Congestion summary (By facility voltage): January through March 2010 (See 2009 SOM, Table 7-7).	158

Table 7-8 Congestion summary (By facility voltage): January through March 2009 (See 2009 SOM, Table 7-8).	159
Table 7-9 Top 25 constraints with frequent occurrence: January through March 2009 and 2010 (See 2009 SOM, Table 7-9).	160
Table 7-10 Top 25 constraints with largest year-to-year change in occurrence: January through March 2009 and 2010 (See 2009 SOM, Table 7-10)	161
Table 7-11 Top 25 constraints affecting annual PJM congestion costs (By facility): January through March 2010 (See 2009 SOM, Table 7-11)	162
Table 7-12 Top 25 constraints affecting annual PJM congestion costs (By facility): January through March 2009 (See 2009 SOM, Table 7-12)	163
Table 7-13 Top congestion cost impacts from Midwest ISO flowgates affecting PJM dispatch (By facility): January through March 2010 (See 2009 SOM, Table 7-13).	164
Table 7-14 Top congestion cost impacts from Midwest ISO flowgates affecting PJM dispatch (By facility): January through March 2009 (See 2009 SOM, Table 7-14).	165
Table 7-15 Regional constraints summary (By facility): January through March 2010 (See 2009 SOM, Table 7-15).	166
Table 7-16 Regional constraints summary (By facility): January through March 2009 (See 2009 SOM, Table 7-16).	166
Table 7-17 Congestion cost summary (By control zone): January through March 2010 (See 2009 SOM, Table 7-17).	167
Table 7-18 Congestion cost summary (By control zone): January through March 2009 (See 2009 SOM, Table 7-18).	168
Table 7-19 AECO Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-19)	169
Table 7-20 AECO Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-20)	170
Table 7-21 BGE Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-21)	171
Table 7-22 BGE Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-22)	172
Table 7-23 DPL Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-23)	173
Table 7-24 DPL Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-24)	174
Table 7-25 JCPL Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-25)	175
Table 7-26 JCPL Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-26)	176
Table 7-27 Met-Ed Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-27)	177
Table 7-28 Met-Ed Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-28)	178
Table 7-29 PECO Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-29)	179
Table 7-30 PECO Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-30)	180
Table 7-31 PENELEC Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-31)	181

*Table 7-32 PENELEC Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-32) . . . . . 182*

*Table 7-33 Pepco Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-33) . . . . . 183*

*Table 7-34 Pepco Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-34) . . . . . 184*

*Table 7-35 PPL Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-35) . . . . . 185*

*Table 7-36 PPL Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-36) . . . . . 186*

*Table 7-37 PSEG Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-37) . . . . . 187*

*Table 7-38 PSEG Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-38) . . . . . 188*

*Table 7-39 RECO Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-39) . . . . . 189*

*Table 7-40 RECO Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-40) . . . . . 190*

*Table 7-41 AEP Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-41) . . . . . 191*

*Table 7-42 AEP Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-42) . . . . . 192*

*Table 7-43 AP Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-43) . . . . . 193*

*Table 7-44 AP Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-44) . . . . . 194*

*Table 7-45 ComEd Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-45) . . . . . 195*

*Table 7-46 ComEd Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-46) . . . . . 196*

*Table 7-47 DAY Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-47) . . . . . 197*

*Table 7-48 DAY Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-48) . . . . . 198*

*Table 7-49 DLCO Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-49) . . . . . 199*

*Table 7-50 DLCO Control Zone top congestion cost impacts (By facility): January through March year 2009 (See 2009 SOM, Table 7-50) . . . . . 200*

*Table 7-51 Dominion Control Zone top congestion cost impacts (By facility): January through March 2010 (See 2009 SOM, Table 7-51) . . . . . 201*

*Table 7-52 Dominion Control Zone top congestion cost impacts (By facility): January through March 2009 (See 2009 SOM, Table 7-52) . . . . . 202*

*Table 8-2 Monthly Balance of Planning Period FTR Auction market volume: January through March 2010 (See 2009 SOM, Table 8-9) . . . . . 206*

*Table 8-3 Monthly Balance of Planning Period FTR Auction buy-bid bid and cleared volume (MW per period): January through March 2010 (See 2009 SOM, Table 8-10) . . . . . 207*

*Table 8-4 Secondary bilateral FTR market volume and weighted-average cleared prices (Dollars per MWh): Planning periods 2008 to 2009 and 2009 to 2010 (See 2009 SOM, Table 8-11) . . . . . 207*

*Table 8-5 Monthly Balance of Planning Period FTR Auction cleared, weighted-average, buy-bid price per period (Dollars per MWh): January through March 2010 (See 2009 SOM, Table 8-14) . . . . . 207*

*Table 8-6 Monthly Balance of Planning Period FTR Auction revenue: January through March 2010 (See 2009 SOM, Table 8-17) . . . . . 207*

*Table 8-7 Total annual PJM FTR revenue detail (Dollars (Millions)): Planning periods 2008 to 2009 and 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-18) . . . . . 208*

*Table 8-8 Monthly FTR accounting summary (Dollars (Millions)): Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-19) . . . . . 209*

*Table 8-9 ARRs and ARR revenue automatically reassigned for network load changes by control zone: June 1, 2008, through March 31, 2010 (See 2009 SOM, Table 8-22) . . . . . 210*

*Table 8-10 ARR revenue adequacy (Dollars (Millions)): Planning periods 2008 to 2009 and 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-24) . . . . . 211*

*Table 8-11 ARR and self scheduled FTR congestion hedging by control zone: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-25) . . . . . 211*

*Table 8-12 FTR congestion hedging by control zone: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-26) . . . . . 212*

*Table 8-13 ARR and FTR congestion hedging by control zone: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-27) . . . . . 214*

*Table 8-14 ARR and FTR congestion hedging: Planning periods 2008 to 2009 and 2009 to 2010 through March 31, 2010 (See 2009 SOM, Table 8-28) . . . . . 215*

*Table 8-15 ARRs and self-scheduled FTR credits as a hedge against energy charges by control zone: January through March 2010 (See 2009 SOM, Table 8-29) . . . . . 215*

*Table 8-16 FTRs as a hedge against energy charges by control zone: January through March 2010 (See 2009 SOM, Table 8-30) . . . . . 216*

*Table 8-17 ARRs and FTRs as a hedge against energy charges by control zone: January through March 2010 (See 2009 SOM, Table 8-31) . . . . . 217*

**SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS . . . . . 203**

*Table 8-1 Monthly Balance of Planning Period FTR Auction patterns of ownership by FTR direction: January through March 2010 (See 2009 SOM, Table 8-5) . . . . . 205*



## FIGURES

### SECTION 1 - INTRODUCTION..... 1

Figure 1-1 PJM’s footprint and its 17 control zones (See 2009 SOM, Figure A-1) . . . 1

### SECTION 2 – ENERGY MARKET, PART 1 ..... 5

Figure 2-1 Average PJM aggregate supply curves: January through March, 2009 and 2010 (See 2009 SOM, Figure 2-1) . . . . . 9

Figure 2-2 Actual PJM footprint peak loads: January through March of 2003 to 2010 (See 2009 SOM, Figure 2-2) . . . . . 9

Figure 2-3 PJM 1<sup>st</sup> quarter peak-load comparison: Monday, January 4, 2010 and Friday, January 16, 2009 (See 2009 SOM, Figure 2-3) . . . . . 9

Figure 2-4 PJM hourly Energy Market HHI: January through March 2010 (See 2009 SOM, Figure 2-4) . . . . . 10

Figure 2-5 Real-time load-weighted unit markup index: January through March 2010 (See 2009 SOM, Figure 2-5) . . . . . 15

Figure 2-6 Day-ahead load-weighted unit markup index: January through March 2010 (See 2009 SOM, Figure 2-6) . . . . . 17

Figure 2-7 PJM real-time load duration curves: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-7) . . . . . 19

Figure 2-8 PJM real-time average load: Calendar years 2009 through March 2010 (See 2009 SOM, Figure 2-8) . . . . . 20

Figure 2-9 PJM day-ahead load duration curves: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-9) . . . . . 20

Figure 2-10 PJM day-ahead average load: Calendar years 2009 through March 2010 (See 2009 SOM, Figure 2-10) . . . . . 21

Figure 2-11 Day-ahead and real-time loads (Average hourly volumes): January through March 2010 (See 2009 SOM, Figure 2-11) . . . . . 21

Figure 2-12 Day-ahead and real-time generation (Average hourly volumes): January through March 2010 (See 2009 SOM, Figure 2-12) . . . . . 22

Figure 2-13 Price duration curves for the PJM Real-Time Energy Market during hours above the 95<sup>th</sup> percentile: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-13) . . . . . 22

Figure 2-14 PJM real-time, monthly, load-weighted, average LMP: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-14) . . . . . 25

Figure 2-15 Spot average fuel price comparison: Calendar years 2009 through March 2010 (See 2009 SOM, Figure 2-15) . . . . . 26

Figure 2-16 Spot average emission price comparison: Calendar years 2009 through March 2010 (See 2009 SOM, Figure 2-16) . . . . . 26

Figure 2-17 Price duration curves for the PJM Day-Ahead Energy Market during hours above the 95<sup>th</sup> percentile: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-17) . . . . . 27

Figure 2-18 Day-ahead, monthly, load-weighted, average LMP: Calendar years 2006 through March 2010 (See 2009 SOM, Figure 2-18) . . . . . 29

Figure 2-19 PJM day-ahead aggregate supply curves: 2010 example day (See 2009 SOM, Figure 2-19) . . . . . 37

Figure 2-20 Real-time load-weighted hourly LMP minus day-ahead load-weighted hourly LMP: January through March 2010 (See 2009 SOM, Figure 2-20) . . . . . 39

Figure 2-21 Monthly simple average of real-time minus day-ahead LMP: January through March 2010 (See 2009 SOM, Figure 2-21) . . . . . 39

Figure 2-22 PJM system simple hourly average LMP: January through March 2010 (See 2009 SOM, Figure 2-22) . . . . . 39

Figure 2-23 Economic Program payments: Calendar years 2007 through 2009 and January through March 2010 (See 2009 SOM, Figure 2-24) . . . . . 44

### SECTION 3 - ENERGY MARKET, PART 2 ..... 49

Figure 3-1 New entrant CT real-time 2009 and 2010 net revenue for January through March and 20-year levelized fixed cost as of 2009 (Dollars per installed MW-year) (See 2009 SOM, Figure 3-3) . . . . . 60

Figure 3-2 New entrant CC real-time 2009 and 2010 net revenue for January through March and 20-year levelized fixed cost as of 2009 (Dollars per installed MW-year) (See 2009 SOM, Figure 3-5) . . . . . 61

Figure 3-3 New entrant CP real-time 2009 and 2010 net revenue for January through March and 20-year levelized fixed cost as of 2009 (Dollars per installed MW-year) (See 2009 SOM, Figure 3-7) . . . . . 62

Figure 3-4 Average hourly real-time generation of wind units in PJM, January through March 2010 (See 2009 SOM, Figure 3-11) . . . . . 68

Figure 3-5 Average hourly day-ahead generation of wind units in PJM, January through March 2010 (See 2009 SOM, Figure 3-12) . . . . . 69

Figure 3-6 Marginal fuel at time of wind generation in PJM, January through March 2010 (See 2009 SOM, Figure 3-13) . . . . . 69

Figure 3-7 Daily RTO reliability and deviation rates (\$/MWh): January through March 2010 (See 2009 SOM, Figure 3-14) . . . . . 74

Figure 3-8 Daily regional reliability and deviation rates (\$/MWh): January through March 2010 (See 2009 SOM, Figure 3-15) . . . . . 74

Figure 3-9 Operating reserve credits: January through March 2010 (See 2009 SOM, Figure 3-16) . . . . . 75

Figure 3-10 Figure 4 Hourly PJM Load: January 1, 2010 through March 31, 2010 (New Figure) . . . . . 85

Figure 3-11 Five Minute Zonal LMPs: January 3, 2010 (New Figure) . . . . . 85

Figure 3-12 Hourly Zonal Loads: January 3, 2010 (New Figure) . . . . . 85

Figure 3-13 Figure 7 Real-time constraints and shadow prices: January 3, 2010 (New Figure) . . . . . 86

### SECTION 4 – INTERCHANGE TRANSACTIONS ..... 89

Figure 4-1 PJM real-time scheduled imports and exports: January through March 2010 (See 2009 SOM, Figure 4-1) . . . . . 94



Figure 4-2 PJM day-ahead scheduled imports and exports: January through March 2010 (See 2009 SOM, Figure 4-2) . . . . . 94

Figure 4-3 PJM scheduled import and export transaction volume history: 1999 through March 2010 (See 2009 SOM, Figure 4-3) . . . . . 95

Figure 4-4 PJM's footprint and its external interfaces (See 2009 SOM, Figure 4-4) . . . . . 99

Figure 4-5 Real-time daily hourly average price difference (Midwest ISO Interface minus PJM/MISO): January through March 2010 (See 2009 SOM, Figure 4-5) . . . . . 99

Figure 4-6 Real-time monthly hourly average Midwest ISO PJM interface price and the PJM/MISO price: April 2005 through March 2010 (See 2009 SOM, Figure 4-6) . . . . . 100

Figure 4-7 Day-ahead daily hourly average price difference (Midwest ISO interface minus PJM/MISO): January through March 2010 (See 2009 SOM, Table 4-7) . . . . . 100

Figure 4-8 Day-ahead monthly hourly average Midwest ISO PJM interface price and the PJM/MISO price: April 2005 through March 2010 (See 2009 SOM, Table 4-8) . . . . . 101

Figure 4-9 Real-time daily hourly average price difference (NY proxy - PJM/NYIS): January through March 2010 (See 2009 SOM, Figure 4-9) . . . . . 101

Figure 4-10 Real-time monthly hourly average NYISO/PJM proxy bus price and the PJM/NYIS price: January 2002 through March 2010 (See 2009 SOM, Figure 4-10) . . . . . 102

Figure 4-11 Day-ahead daily hourly average price difference (NY proxy - PJM/NYIS): January through March 2010 (See 2009 SOM, Table 4-11) . . . . . 102

Figure 4-12 Day-ahead monthly hourly average NYISO/PJM proxy bus price and the PJM/NYIS price: January 2009 through March 2010 (See 2009 SOM, Figure 4-12) . . . . . 102

Figure 4-13 PJM, NYISO and Midwest ISO real-time border price averages: January through March 2010 (See 2009 SOM, Figure 4-13) . . . . . 102

Figure 4-14 PJM, NYISO and Midwest ISO day-ahead border price averages: January through March 2010 (See 2009 SOM, Figure 4-14) . . . . . 103

Figure 4-15 Credits for coordinated congestion management: January through March 2010 (See 2009 SOM, Figure 4-15) . . . . . 103

Figure 4-16 Neptune hourly average flow: January through March 2010 (See 2009 SOM, Figure 4-16) . . . . . 103

Figure 4-17 Linden hourly average flow: January through March 2010 (See 2009 SOM, Figure 4-17) . . . . . 104

Figure 4-18 Southwest actual and scheduled flows: January 2006 through March 2010 (See 2009 SOM, Figure 4-18) . . . . . 105

Figure 4-19 Southeast actual and scheduled flows: January 2006 through March 2010 (See 2009 SOM, Figure 4-19) . . . . . 105

Figure 4-20 PJM and Midwest ISO TLR procedures: Calendar year 2009 and January through March 2010 (See 2009 SOM, Figure 4-20) . . . . . 105

Figure 4-21 Number of different PJM flowgates that experienced TLRs: Calendar year 2009 and January through March 2010 (See 2009 SOM, Figure 4-21) . . . . . 105

Figure 4-22 Number of PJM TLRs and curtailed volume: January through March 2010 (See 2009, Figure 4-22) . . . . . 106

Figure 4-23 Monthly up-to congestion bids in MWh: January 2006 through March 2010 (See 2009 SOM, Figure 4-23) . . . . . 106

Figure 4-24 Total settlements showing positive, negative and net gains for up-to congestion bids with a matching Real-Time Market transaction: January through March 2010 (See 2009 SOM, Figure 4-24) . . . . . 107

Figure 4-25 Total settlements showing positive, negative and net gains for up-to congestion bids without a matching Real-Time Market transaction: January through March 2010 (See 2009 SOM, Figure 4-25) . . . . . 107

Figure 4-26 Real-time interchange volume vs. average hourly LMP available for Duke and PEC imports: January through March 2010 (See 2009 SOM, Figure 4-26) . . . . . 108

Figure 4-27 Real-time interchange volume vs. average hourly LMP available for Duke and PEC exports: January through March 2010 (See 2009 SOM, Figure 4-27) . . . . . 108

Figure 4-28 Day-ahead interchange volume vs. average hourly LMP available for Duke and PEC imports: January through March 2010 (See 2009 SOM, Figure 4-28) . . . . . 109

Figure 4-29 Day-ahead interchange volume vs. average hourly LMP available for Duke and PEC exports: January through March 2010 (See 2009 SOM, Figure 4-29) . . . . . 109

Figure 4-30 Spot import service utilization: January 2009 through March 2010 (See 2009 SOM, Figure 4-30) . . . . . 109

Figure 4-31 Monthly uncollected congestion charges: January through March 2010 (See 2009 SOM, Figure 4-31) . . . . . 110

Figure 4-32 Distribution of expired ramp reservations in the hour prior to flow (Old rules (Theoretical) and new rules (Actual)) October 2006 through March 2010 (See 2009 SOM, Figure 4-32) . . . . . 110

**SECTION 5 – CAPACITY MARKET . . . . . 111**

Figure 5-1 History of capacity prices: Calendar year 1999 through 2012 (See 2009 SOM, Figure 5-1) . . . . . 123

Figure 5-2 RTO market supply/demand curves: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Figure 5-2) . . . . . 124

Figure 5-3 MAAC+APS supply/demand curves: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Figure 5-3) . . . . . 125

Figure 5-4 SWMAAC supply/demand curves: 2009/2010 RPM Base Residual Auction (See 2009 SOM, Figure 5-4) . . . . . 126

Figure 5-5 RTO supply/demand curves: 2009/2010 RPM Third Incremental Auction (See 2009 SOM, Figure 5-5) . . . . . 127

Figure 5-6 MAAC+APS supply/demand curves: 2009/2010 RPM Third Incremental Auction (See 2009 SOM, Figure 5-6) . . . . . 128

Figure 5-7 PJM equivalent outage and availability factors: Calendar years 2006 to 2010 (January through March) (See 2009 SOM, Figure 5-7) . . . . . 128

Figure 5-8 Trends in the PJM equivalent demand forced outage rate (EFORd): Calendar years 2006 to 2010 (January through March) (See 2009 SOM, Figure 5-8) . . . . . 129

Figure 5-9 PJM 2010 (January through March) Distribution of EFORd data by unit type (See 2009 SOM, Figure 5-9) . . . . . 129

Figure 5-10 Contribution to EFORd by duty cycle: Calendar years 2006 to 2010 (January through March) (See 2009 SOM, Figure 5-10) . . . . . 130

Figure 5-11 PJM 2010 (January through March) distribution of EFORd data by unit type (See 2009 SOM, Figure 5-11) . . . . . 133

Figure 5-12 PJM peak month data: 2010 (See 2009 SOM, Figure 5-12) . . . . . 133

Figure 5-13 PJM peak month generator performance factors: 2010 (See 2009 SOM, Figure 5-13) . . . . . 134

**SECTION 6 - ANCILLARY SERVICE MARKETS . . . . . 135**

Figure 6-1 Figure 6-1 PJM Regulation Market HHI distribution: January through March 2010 (See 2009 SOM, Figure 6-1) . . . . . 140

Figure 6-2 Off peak and on peak regulation levels: January through March 2010 (See 2009 SOM, Figure 6-2) . . . . . 141

Figure 6-3 PJM Regulation Market daily average market-clearing price, opportunity cost and offer price (Dollars per MWh): January through March 2010 (See 2009 SOM, Figure 6-3) . . . . . 141

Figure 6-4 Monthly average regulation demand (required) vs. price: January through March 2010 (See 2009 SOM, Figure 6-4) . . . . . 142

Figure 6-5 Monthly load weighted, average regulation cost and price: January through March 2010 (See 2009 SOM, Figure 6-5) . . . . . 142

Figure 6-6 RFC Synchronized Reserve Zone monthly average synchronized reserve required vs. Tier 2 scheduled MW: January through March 2010 (See 2009 SOM, Figure 6-6) . . . . . 146

Figure 6-7 RFC Synchronized Reserve Zone, Mid-Atlantic Subzone average hourly synchronized reserve required vs. Tier 2 scheduled: January through March 2010 (See 2009 SOM, Figure 6-7) . . . . . 146

Figure 6-8 Purchased Mid-Atlantic Subzone RFC Tier 2 Synchronized Reserve Market seasonal HHI: January through March 2010 (See 2009 SOM, Figure 6-8) . . . . . 147

Figure 6-9 Tier 2 synchronized reserve average hourly offer volume (MW): January through March 2010 (See 2009 SOM, Figure 6-9) . . . . . 147

Figure 6-10 Average daily Tier 2 synchronized reserve offer by unit type (MW): January through March 2010 (See 2009 SOM, Figure 6-10) . . . . . 148

Figure 6-11 PJM RFC Zone Tier 2 synchronized reserve scheduled MW: January through March 2010 (See 2009 SOM, Figure 6-11) . . . . . 148

Figure 6-12 Required Tier 2 synchronized reserve, Synchronized Reserve Market clearing price, and DSR percent of Tier 2: January through March 2010 (See 2009 SOM, Figure 6-12) . . . . . 149

Figure 6-13 RFC Synchronized Reserve Zone, Mid-Atlantic Subzone daily average hourly synchronized reserve required, Tier 2 MW scheduled, and Tier 1 MW estimated: January through March 2010 (See 2009 SOM, Figure 6-13) . . . . . 149

Figure 6-14 Tier 2 synchronized reserve purchases by month for the Mid-Atlantic Subzone: January through March 2010 (See 2009 SOM, Figure 6-14) . . . . . 150

Figure 6-15 Figure 6-15 Impact of Tier 2 synchronized reserve added MW to the RFC Synchronized Reserve Zone, Mid-Atlantic Subzone: January through March 2010 (See 2009 SOM, Figure 6-15) . . . . . 150

Figure 6-16 Comparison of RFC Mid-Atlantic Subzone Tier 2 synchronized reserve price and cost (Dollars per MW): January through March 2010 (See 2009 SOM, Figure 6-16) . . . . . 150

**SECTION 8 – FINANCIAL TRANSMISSION AND AUCTION REVENUE RIGHTS . . . . . 203**

Figure 8-1 Ten largest positive and negative revenue producing FTR sinks purchased in the Monthly Balance of Planning Period FTR Auctions: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Figure 8-7) . . . . . 208

Figure 8-2 Ten largest positive and negative revenue producing FTR sources purchased in the Monthly Balance of Planning Period FTR Auctions: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Figure 8-8) . . . . . 208

Figure 8-3 Ten largest positive and negative FTR target allocations summed by sink: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Figure 8-9) . . . . . 209

Figure 8-4 Ten largest positive and negative FTR target allocations summed by source: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Figure 8-10) . . . . . 210

Figure 8-5 Annual FTR Auction prices vs. average day-ahead and real-time congestion for all control zones relative to the Western Hub: Planning period 2009 to 2010 through March 31, 2010 (See 2009 SOM, Figure 8-11) . . . . . 211

