

# LIST OF FIGURES

## EXECUTIVE SUMMARY

Figure E.1	1998 through 2003 Wholesale Energy Cost Components .....	E-1
Figure E.2	2002 and 2003 Monthly Average Natural Gas Prices .....	E-2
Figure E.3	Hourly Load Duration Curves, 2001-2003 .....	E-4
Figure E.4	2002 and 2003 Sources of Energy .....	E-6
Figure E.5	2001 through 2003 Average Annual Net Imports .....	E-6
Figure E.6	2002 and 2003 Monthly Outages .....	E-7
Figure E.7	1999 Through 2003 Forced Outage Rates .....	E-8
Figure E.8	1999-2003 Reserves Margins During Annual Peak Load Hour .....	E-9
Figure E.9	Monthly Average Loads and Deviations between Schedules and Loads 2000 through 2003 .....	E-10
Figure E.10	2002 and 2003 Monthly Average Imbalance Volumes and Prices .....	E-10
Figure E.11	Estimated Mark-up for Day Ahead Bilateral Energy Markets in NP15 for 2003 .....	E-12
Figure E.12	Hourly Residual Supplier Index 1999-2003 .....	E-13
Figure E.13	Monthly Weighted Average Ancillary Service Prices, 2002-2003 .....	E-16
Figure E.14	Average Hourly Net A/S Supply by Month, 2002-2003 .....	E-17
Figure E.15	2003 California ISO Major Congested Interties and Congestion Costs .....	E-19
Figure E.16	2002 and 2003 Monthly Interzonal Congestion Costs .....	E-21
Figure E.17	2002 and 2003 Congestion Revenues on Selected Paths .....	E-21
Figure E.18	2003 Monthly Total Intrazonal Congestion Costs .....	E-23

## CHAPTER 1

Figure 1.1	2003 Summer Weekday Capacities .....	1-14
Figure 1.2	2003 Summer Weekend Capacities .....	1-14
Figure 1.3	2003 Non-Summer Weekday Capacities .....	1-15
Figure 1.4	2003 Non-Summer Weekend Capacities .....	1-15
Figure 1.5	Monthly Capacities, January 2003 to December 2010 .....	1-16

## CHAPTER 2

Figure 2.1	Load Duration Curves, 2001-2003 .....	2-1
Figure 2.2	2001-2003 Annual Average System Wide Imports and Exports .....	2-3
Figure 2.3	Weekly Average Daily Natural Gas Prices .....	2-5
Figure 2.4	Total United States Natural Gas Storage Levels (billion ft <sup>3</sup> ) .....	2-5
Figure 2.5	Western United States Natural Gas Storage Levels (billion ft <sup>3</sup> ) .....	2-6
Figure 2.6	2003 Average Monthly Energy Percentage by Fuel Type .....	2-7
Figure 2.7	2003 Weekly Average Outage Levels .....	2-8
Figure 2.8	1999-2003 Forced Outage Rate .....	2-8
Figure 2.9	2002 All-In Price: \$45.06 per MWh of load served .....	2-13
Figure 2.10	2003 All-In Price: \$54.92 per MWh of load served .....	2-13
Figure 2.11	Annual All-In Prices: 2002 vs. 2003 .....	2-13
Figure 2.12	Monthly Average All-In Prices, 2003-2003 .....	2-14
Figure 2.13	Market-Clearing Price vs. Two Estimates of Competitive Baseline Price: 2002-2003 .....	2-16
Figure 2.14	2003 Short-term Forward Market Index – NP15 .....	2-18
Figure 2.15	2003 Short-term Forward Market Index – SP15 .....	2-19
Figure 2.16	Residual Supplier Index 1999-2003 .....	2-20
Figure 2.17	AMP Conduct Test Effectiveness in 193 Market Power-Susceptible Hours .....	2-28
Figure 2.18	Bids and AMP Reference Levels for a Unit that Set Prices above \$100, Normalized for Gas Price Changes .....	2-29
Figure 2.19	Daily Average Price Compared to Estimated Prices When Bids are Mitigated to Reference Levels, when Daily Average Price exceeds \$85/MWh .....	2-30

## CHAPTER 3

Figure 3.1	Monthly Zonal Market-Clearing Prices in All, Peak, and Off-Peak Hours .....	3-2
Figure 3.2	Monthly Average Loads and Deviations between Schedules and Loads Through 2003 .....	3-4
Figure 3.3	Real-Time Incremental Price Duration Curves, 2001-2003 .....	3-5
Figure 3.4	Real-Time Decremental Price Duration Curves, 2001-2003 .....	3-5
Figure 3.5	History of Import Bid Volume in Real Time Market: Weekly Averages through December 2003 .....	3-8

## **CHAPTER 4**

Figure 4.1	Annual A/S Prices and Volumes, 1999-2003 .....	4-4
Figure 4.2	Monthly Cost of A/S per MWh of Load.....	4-5
Figure 4.3	Monthly Weighted Average A/S Prices, 2002-2003 .....	4-6
Figure 4.4	Monthly-Average Hourly A/S Demand and Procurement, 2002-2003.....	4-7
Figure 4.5	Hourly Average Day-Ahead Procurement, 2002-2003.....	4-8
Figure 4.6	Hourly Average Self-Provision, 2002-2003.....	4-9
Figure 4.7	Average Hourly Net A/S Supply by Month, 2002-2003 .....	4-10
Figure 4.8	Frequency of A/S Bid Insufficiency, 2002-2003.....	4-11
Figure 4.9	A/S Certified and Offered Capacity, October 2002 vs. October 2003 .....	4-12
Figure 4.10	Hourly-Average, Day-Ahead Regulation Up Bid Composition, 2002-2003 .....	4-13
Figure 4.11	Hourly-Average, Day-Ahead Regulation Down Bid Composition, 2002-2003 .....	4-14
Figure 4.12	Hourly-Average, Day-Ahead Spinning Reserve Bid Composition, 2002-2003 .....	4-15
Figure 4.13	Hourly Average Non-Spinning Reserve Bid Composition, 2002-2003 .....	4-16

## **CHAPTER 5**

Figure 5.1	Congestion Zones and Main Interzonal Pathways in the CAISO Grid .....	5-2
Figure 5.2	Congestion Revenues on Selected Paths, 2002 vs. 2003.....	5-9
Figure 5.3	Monthly Congestion Charges of Selected Major Paths, 2003 .....	5-9
Figure 5.4	Adjusted Bid Sufficiency Index in the Day-ahead Market, 2003 .....	5-10
Figure 5.5	Phantom Congestion on Major Paths, 2003 .....	5-12, 5-13

## **CHAPTER 6**

Figure 6.1	2003 Incremental and Decremental Redispatch Premium and Reduced Costs From Local AMP .....	6-8
Figure 6.2	2003 Out-of-Sequence Volumes and Redispatch Premiums .....	6-9
Figure 6.3	2003 Monthly Total Intrazonal Congestion Costs.....	6-11