APPENDIX A
CRR STUDY REPORT

Definitions

Name	Definition
AP-Node	A price node calculated through load weighting of various P-Nodes. Defining AP-nodes as a weighted sum of P-nodes reduces volatility and stabilizes prices (compared to a single price node). CRR bids can be entered from/to P-nodes as well as AP-nodes.
Branch Limits	A MW limit that restricts the flow on a transmission facility or a group of transmission elements. The limit could be a thermal, voltage or stability limit within the ISO footprint under normal operating conditions or for specific and credible monitored contingencies.
Comparable CRRs	CRRs that are identical in all material respects except for the quantity of MW specified.
Competing CRR Bids	Bids in an CRR allocation/auction that are identical in all material respects except for the quantity of MW sought and/or the price offered. Competing bids may contain the same MW quantity and/or offer price.
Conforming Load	Load that conforms to the overall load profile of a specific area or zone.
Congestion Revenue Rights (CRR)	A financial contract that entitles the CRR Holder to a stream of revenues (or charges) based on the hourly energy price differences across specified network locations in the Day-Ahead Market. Holders of Point-to-Point CRRs also hold physical scheduling rights (i.e. priority against schedule curtailment) in the Day-Ahead Market. Transmission capacity for which scheduling rights have not been utilized by CRR Holders in the Day-Ahead Market becomes available as New Firm Use in the Day-Ahead and subsequent Markets, as specified in the ISO Tariff.
Constraints	A limitation on a transmission element or a group of transmission elements due to thermal, voltage or stability considerations within the ISO footprint.
CRR Auction	An auction conducted each year and each month through which the ISO: 1) sells CRRs one year and one month in duration for the adjusted CRR capacity of the ISO footprint, and 2) facilitates the buying and selling of existing CRRs between Market Participants.
CRR Bidder	A Market Participant submitting a CRR bid.
CRR Delivery Point	The transaction delivery point specified in a Receipt Point-to-Delivery Point CRR.
CRR Holder	A Market Participant that owns one or more CRRs.
CRR Market Clearing Price	The price at which a set of Comparable CRRs are allocated/sold through a CRR allocation/auction process.
CRR Obligations	A CRR that pays the CRR Holder when the hourly Day-Ahead Locational Marginal Price at the Sink specified by the CRR is greater than the Locational Marginal Price at the Source specified by the CRR (i.e., Sink LMP – Source LMP > 0), and charges the CRR Holder when this price difference is reversed (i.e., Sink LMP – Source LMP < 0).
CRR Optimizer	The software module that optimizes the CRR allocations in order to maximize the revenues from the CRRs subject to the constraints of the ISO controlled transmission grid.
CRR Options	A CRR that pays the CRR Holder when the hourly Day-Ahead Locational Marginal Price at the Sink specified by the CRR is greater than the Locational Marginal Price at the Source specified by the CRR (i.e., Sink LMP – Source LMP > 0), but does not charge the CRR Holder when this price difference is reversed (i.e., Sink LMP – Source LMP < 0).

CRR Period	The periods of time on a given day during which a CRR is in effect (in particular, On-Peak, Off-Peak, etc.)
CRR Receipt Point	The transaction receipt point specified in a Receipt Point-to-Delivery Point CRR.
E-Node	The underlying Electrical Nodes (E-nodes) at the bus level. E-Nodes are mapped to scheduling points or Price Nodes (P-nodes) and Aggregate Price Nodes (AP-Nodes). For example, P-nodes are created for the three Trading Hubs of NP15, ZP26 and SP15.
Existing Contracts (ETCs)	The contracts, which grant transmission service rights (as defined in Section 2.4.4.1.1) in existence on the ISO Operations Date (including any contracts entered into pursuant to such contracts) as may be amended in accordance with their terms or by agreement between the parties thereto from time to time.
Full Network Model (FNM)	A detailed computer model operated by the ISO and used to create an instantaneous view of the state of the ISO footprint.
Import	Energy delivered to the ISO footprint from a service area outside the ISO footprint.
Interface Limits	A MW limit that restricts the flow on a group of transmission elements. The limit could be a thermal, voltage or stability limit within the ISO footprint under normal operating conditions or for specific and credible monitored contingencies.
Load Aggregations	The process where individual load connected to a set of power system nodes, not necessarily contiguous, is aggregated to a single load for the purpose of scheduling or settlement.
Load Duration Curve	The curve that determines the load of an LSE as a function of time. It is calculated based on historical load provided by the LSEs.
Load Serving Entity	"Any Market Participant (or the duly designated agent of such an entity, including, e.g., a Scheduling Coordinator), including a load aggregator or power marketer, (1) serving End Users within the ISO Control Area or (2) that has been granted the authority or has an obligation pursuant to California State or local law, regulation or franchise to sell electric energy to End Users located within the ISO Control Area."
Long-Term CRRs	CRRs with a term of one year.
Marginal Congestion Component	A component of LMP and the Transmission Congestion Charge reflecting the cost of dispatching resources available to the ISO such that transmission constraints are respected.
Marginal Losses	The ISO transmission system active power losses associated with each additional MWh of consumption by load, or each additional MWh transmitted under a Bilateral Transaction, as measured at the points of withdrawal.
Marginal Loss Component	The component of the LMP price at a bus, hub or Load Zone that accounts for the cost of marginal losses, as measured between that location and the reference bus.
Network Service Rights	Network Service Right is a fixed power transfer from multiple sources to multiple sinks for specific amounts of power injections and ejections at the associated sources and sinks and are offered as FTR Obligations. Network Service Rights are solely financial rights; they are paid the sum of the products of the Day-Ahead Locational Marginal Prices (LMPs) at the associated sinks multiplied by the respective power ejections and are charged the sum of the products of the Day-Ahead LMPs at the associated sources multiplied by the respective power injections. The

	LMP at a hub is the weighted average of the LMPs at the underlying network nodes where the corresponding LDFs are used as weights.
Network Upgrade	All or a portion of the modifications or additions to transmission-related facilities that are integrated with and support the ISO's overall Transmission System for the general benefit of all users of such Transmission System.
Node	The physical injection point for a generator and a physical withdrawal point for a load.
Non-Conforming Load	Load that does not conforms to the overall load profile of a specific area or zone.
Non-Converted ETCs	Those ETCs for which the rights holders have chosen not to convert to CRRs (either options or obligations).
Objective Function	The function the CRR optimizer maximizes subject to constraints
P-Node	Single nodes that locational prices are calculated by the CRR system. In a large scale system there could be thousands of these P-nodes.
Point-to-Point CRRs	CRRs that consist of balanced power transfers from a Source to a Sink. The Sources and Sinks for Point-to-Point Rights must be network nodes, Load Aggregation Points or Trading Hubs.
Point(s) of Delivery (POD)	Point(s) on the ISO Transmission System where capacity and energy transmitted by the ISO are made available to the Receiving Party.
Point(s) of Receipt (POR)	Point(s) of interconnection on the ISO Transmission System where capacity and energy tare made available to the ISO by the Delivering Party.
Previously Converted ETCs	Those ETCs for which the rights holders have chosen to convert to CRRs (either options or obligations).
Reference Bus	The location on the ISO footprint relative to which all mathematical quantities, including Shift Factors or PTDFs and penalty factors relating to physical operation are calculated.
Shift Factor or Power Transfer Distribution Factors (PTDFs)	A ration calculated by the ISO, that compares the 1) change in power flow through a transmission facility resulting from an incremental change in injection of power at a Transmission Receipt Point and withdrawal of power at the Transaction Delivery Point to 2) the incremental change of power at the Transaction Receipt Point. The PTDFs apply only to the pre-contingency configurations of the system under study.
Short-Term CRRs	CRRs with a term of one month.
Simultaneous Feasibility Test (SFT)	The Simultaneous Feasibility Test (SFT) is a market feasibility test that will be run by the CAISO to check for revenue adequacy by ensuring that the transmission system can support the subscribed set of CRRs during normal system conditions, including credible single contingencies. The test models the flow according to the MW values of the CRRs on each line and determines if these values can be supported with causing a transmission line violation.
Simultaneously Feasible	A state in which each set of injections and withdrawals associated with Receipt Point-to-Delivery Point CRRs would not exceed any thermal, voltage or stability limits within the ISO footprint under normal operating conditions or for specific and credible monitored contingencies.
Sink	The location, bus, or load zone receiving the transferred energy or the point of receipt of the energy in a contract.
Transmission Congestion Charges	Charges attributable to the increased cost of energy delivered at a given load bus when the Transmission System serving the load bus is

	operating under constrained conditions. It is the per unit charge for Transmission Service to support a Bilateral Transaction Schedule and is equal to the difference in the LMP at the Transaction Delivery Point and the LMP at the Transaction Receipt point (in $/MWh).
Transaction Congestion Credit	The allocated share of total Transmission Congestion Charges credited to each holder of transmission rights.
Upper Bound of CRR Allocation Request	The 99.5 % point in the load duration curve of an LSE. It determines the upper bound of the CRRs that can be allocated to an LSE based on historical usage.

Data Request

Entities that Provided LSE Data for CRR Study
Anaheim
Azusa
Banning
CDWR
Constellation New Energy
Lassen MUD
NCPA
Pasadena
PG&E
Port of Oakland
Riverside
SCE
SDG&E
Sempra Energy Solutions
Silicon Valley Power
SoCal Water Co
Strategic Energy
Vernon

List of Upgrades in Full Network Model

Transmission Project	Upgrade Overview	Impact on transfer capability
North East San Jose Project	Removed 4 lines; Added 3new buses, 11 lines and 2 transformers.	More transfer capability with the addition of new lines and transformers
South of Lugo Project	Upgraded line ratings on 3 lines	More transfer capability with increased line ratings
Path 15 Project	Added 2 New 500 kV lines	Increase of south to north transfer capability
Ravenswood San Mateo re-conductoring Project	Replacement of line, change impedance and thermal rating	More transfer capability with increased line ratings
Imperial Valley 500/230 kV transformer addition and replacement	Removed 1 transformer and added 2 new transformers	More transfer capability with the addition of new transformers
Vincent transformer replacement	Added 1 new transformer	More transfer capability with the addition of new transformers
Metcalf third 500/230 kV transformer addition	Added 1 new transformer	More transfer capability with the addition of new transformers
Midway third 500/230 kV transformer addition	Added 1 new transformer	More transfer capability with the addition of new transformers
Path 26 upgrade	Upgraded Remedial Action Scheme (RAS)	More transfer capability in the north to south direction (by 400 MW). Increases Path15 OTC by 400 MW in north to south direction.

Table of Interface Names and Limits Used for the CRR Study

Interface Name	OTC	Interface Name	OTC
BLYTHE _BG IN	87	MERCHANT _BG IN	645
BLYTHE _BG OUT	72	MERCHANT _BG OUT	645
CASCADE _BG IN	80	N.GILABK4_BG IN	240
CASCADE _BG OUT	30	N.GILABK4_BG OUT	240
CFE _BG IN	800	NOB _BG IN	2046
CFE _BG OUT	408	NOB _BG OUT	1975
COI _BG IN	4650	North Bay IN	120
COI _BG OUT	3675	North Bay OUT	120
ELDORADO _BG IN	1555	PALOVRDE _BG IN	2823
ELDORADO _BG OUT	1555	PALOVRDE _BG OUT	2823
ELVTHRLY_BG IN	2077	PARKER _BG IN	220
ELVTHRLY_BG OUT	2077	PARKER _BG OUT	60
Fresno IN	1650	PATH15 _BG N to S	1675
Fresno OUT	1650	PATH15 _BG S to N	5032
Greater Bay Area IN	5150	PATH26 _BG N to S	3400
Greater Bay Area OUT	5150	PATH26 _BG S to N	3000
HUMBOLDT _BG IN	70	RNCHLAKE_BG IN	1291
HUMBOLDT _BG OUT	70	RNCHLAKE_BG OUT	1291
IID-SCE _BG IN	600	San Diego IN	2450
IID-SCE _BG OUT	100	San Diego OUT	2450
IID-SDGE _BG IN	225	SF _BG IN	900
IID-SDGE _BG OUT	225	SF _BG OUT	900
INYO _BG IN	56	SILVERPK _BG IN	17
INYO _BG OUT	56	SILVERPK _BG OUT	17
LAUGHLIN _BG IN	220	SUMMIT _BG IN	120
LAUGHLIN _BG OUT	222	SUMMIT _BG OUT	100
MCCULLGH _BG IN	2598	SYLMAR-AC_BG IN	1200
MCCULLGH _BG OUT	2598	SYLMAR-AC_BG OUT	1200
MEAD _BG IN	1460	VICTVL _BG IN	2400
MEAD _BG OUT	1460	VICTVL _BG OUT	900

Aggregated Demand Zones and Load Group Information

Pnode_DZ	DZRLoad	Pnode_LG	LGRLoad	Load Distribution Factor
PGE3	17982.78	PGHB	131.08	0.007289196
PGE3	17982.78	SF _LG	675.42	0.037559265
PGE3	17982.78	PGP1	301.13	0.016745464
PGE3	17982.78	PGEB	3060.27	0.170177803
PGE3	17982.78	PGP2	1288.08	0.071628525
PGE3	17982.78	PGSB	1667.26	0.092714252
PGE3	17982.78	PGDA	535.75	0.02979239
PGE3	17982.78	PGME	345.48	0.019211713
PGE3	17982.78	PGSJ	9.8	0.000544966
PGE3	17982.78	CS1 _LG	399	0.022187893
PGE3	17982.78	PGF1	2601.17	0.144647824
PGE3	17982.78	PGNC	220.55	0.012264511
PGE3	17982.78	PGBC	128.11	0.007124038
PGE3	17982.78	PGCC	635.39	0.035333247
PGE3	17982.78	PGSN	295.8	0.01644907
PGE3	17982.78	PGNB	616.84	0.034301704
PGE3	17982.78	PGNV	630.04	0.03503574
PGE3	17982.78	RD1 _LG	85.4	0.004748988
PGE3	17982.78	PGSA	593.24	0.032989338
PGE3	17982.78	PGVA	331.33	0.018424849
PGE3	17982.78	PGDE	466.2	0.025924801
PGE3	17982.78	PGSI	515.61	0.02867243
PGE3	17982.78	PGST	1340.9166	0.074566702
PGE3	17982.78	MI1 _LG	244.183404	0.013578735
PGE3	17982.78	TI1 _LG	267.3	0.01486422
PGE3	17982.78	PGFG	597.43	0.033222338
PGE4	2114.16	PGLP	2114.16	1
SCE1	20361.67	SCLD	855.14	0.041997538
SCE1	20361.67	SCEA	8899.68	0.437080063
SCE1	20361.67	SCWE	2836.05	0.139283762
SCE1	20361.67	SCNW	1451.63	0.071292286
SCE1	20361.67	SCNO	1400.92	0.068801822
SCE1	20361.67	SCHD	327.97	0.016107225
SCE1	20361.67	SCSO	4590.28	0.225437305
SDG1	3881.48	SDG1	3881.48	1
CDWR5	1	CDWR5	1	1
CDWR6	1	CDWR6	1	1
CDWR7	1	CDWR7	1	1

Process to Determine Upper Bound of Annual CRR Allocations to LSEs and Previously Converted ETCs

1. Develop the historical load duration curve for each month of the one-year Historical Reference Period (HRP) and calculate the 0.5% exceedence level for each month.
2. Calculate the Load Metric, which equals the smallest 0.5% exceedence level calculated for the 12 months of the HRP.
3. Determine the total quantity of ETCs (or Converted ETCs) held by the Load Serving Entity whose Upper Bound is being determined.
4. Calculate the Upper Bound for annual CRR allocations.
    i. Annual Upper Bound = (Load Metric – ETC) X 0.75

Please note that the Annual Upper Bound has been scaled by 75% since 75% of the capacity in the network will be used in the SFT for the annual term CRR allocation. The remaining capacity will be utilized for monthly CRR allocations.

Process to Determine the Upper Bound of Monthly CRR Allocations to LSEs and Previously Converted ETCs.

1. Develop a forecasted load duration curve for the month.
2. Calculate the load metric for the month, which equals the 0.5% exceedence level for the month.
3. Calculate the Upper Bound for the monthly CRR allocation.

    Monthly Upper Bound = (Monthly Load Metric – Annual Upper Bound – ETC)

Summary of Results of all Market Runs

Market	Time Period	Participant Type	Hedge Type	Class Type	Sum Of Bid Amounts (MW)	Sum Of Cleared Bids (MW)	Percentage of Bid Amount MWs that Cleared
Market_01	Year 2005	ETC	Option	OffPeak	11,807.90	11,227.30	95%
			Option	OnPeak	11,830.80	11,271.50	95%
Market_02	Year 2005	Converted Rights	Option	OffPeak	963.00	963.00	100%
			Option	OnPeak	963.00	963.00	100%
Market_02	Year 2005	LSE	Obligation	OffPeak	15,856.70	14,952.00	94%
			Obligation	OnPeak	18,575.80	17,442.50	94%
Market_03	March	Converted Rights	Option	OffPeak	317.30	317.30	100%
			Option	OnPeak	317.30	293.60	93%
Market_04	March	LSE	Obligation	OffPeak	8,035.50	7,601.70	95%
			Obligation	OnPeak	9,576.00	7,621.80	80%
Market_05	June	Converted Rights	Option	OffPeak	317.30	317.30	100%
			Option	OnPeak	317.30	293.60	93%
Market_06	June	LSE	Obligation	OffPeak	12,100.00	11,590.00	96%
			Obligation	OnPeak	17,804.30	15,552.90	87%
Market_07	August	Converted Rights	Option	OffPeak	317.30	317.30	100%
			Option	OnPeak	317.30	293.60	93%
Market_08	August	LSE	Obligation	OffPeak	14,584.00	13,419.50	92%
			Obligation	OnPeak	22,035.30	19,987.10	91%
Market_09	November	Converted Rights	Option	OffPeak	317.30	317.30	100%
			Option	OnPeak	317.30	293.60	93%
Market_10	November	LSE	Obligation	OffPeak	9,893.20	9,412.20	95%
			Obligation	OnPeak	11,130.60	9,553.20	86%

Binding Constrains Tables

The following 10 tables provide information on the constraints that were binding for each of the Markets run for the CRR Study.

Market 1 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
EAGLEMT3230. 1033_I	BASE	All	45	<=	45	0	45	<=	45	0
EAGLEMT3230. 1033_Z	BASE	All	45	<=	45	0	45	<=	45	0
IID-SCE _BG OUT	GNRC	All	100	<=	100	0	100	<=	100	0
INTK69_N69.0 1045_I	BASE	All	33	<=	33	0	33	<=	33	0
IRON_MTN230. 1038_I	BASE	All	16.5	<=	16.5	0	16.5	<=	16.5	0
IRON_MTN230. 1038_Z	BASE	All	16.5	<=	16.5	0	16.5	<=	16.5	0
J.HINDS 230. 1042_I	BASE	All	45	<=	45	0	45	<=	45	0
J.HINDS 230. 1042_Z	BASE	All	45	<=	45	0	45	<=	45	0
MOHAVE 500. 554_Z	BASE	All	825	<=	825	0	825	<=	825	0
PARKER _BG OUT	GNRC	All	60	<=	60	0	60	<=	60	0
WND_GPT1230. 4378_I	BASE	All					54	<=	54	0

Market 2 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
ARCO_SC 230. 375 Z	FTRO	All	100	<=	100	0	100	<=	100	0
BAF_COG113.0 3777 I	FTRO	All	45	<=	45	0				
BAF_COG113.0 3777_I	BASE	All					45	<=	45	0
BDLARKSP69.0 36 Z	FTRO	All	60	<=	60	0				
BLM_EAST230. 856_Z	BASE	All	24	<=	24	0	24	<=	24	0
CAL_GEN 115. 939_Z	BASE	All	35.4	<=	35.4	0	35.4	<=	35.4	0
CHINO__166.0 400 Z	FTRO	All	49.5	<=	49.5	0				
CHINO__166.0 400_Z	BASE	All					49.5	<=	49.5	0
CHINO__166.0 401 Z	FTRO	All	40.7	<=	40.7	0				
CHINO__166.0 401_Z	BASE	All					40.7	<=	40.7	0
DIVISION69.0 71 Z	FTRO	All	53	<=	53	0	53	<=	53	0
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
GWF-PWR. 9.0 3239 I	FTRO	All	26.9	<=	26.9	0				
INYO___1115. 885_I	BASE	All	56	<=	56	0	56	<=	56	0
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
MAGUNDE3230. 526_Z	BASE	All	643	<=	643	0	643	<=	643	0
MC_GEN_2115. 894_Z	BASE	All	118.8	<=	118.8	0	118.8	<=	118.8	0
MIRIID 230. 12_I	BASE	All	392.8	<=	392.8	0	392.8	<=	392.8	0
MOGEN 115. 899 Z	FTRO	All	62.5	<=	62.5	0				
NAVY_II 115. 902_Z	BASE	All	30	<=	30	0	30	<=	30	0
PARKER _BG OUT	GNRC	All	60	<=	60	0				
S.CLARA166.0 603 Z	FTRO	All	45.9	<=	45.9	0				
S.ONOFRE230. 615_Z	BASE	All	1230	<=	1230	0	1230	<=	1230	0
S.ONOFRE230. 616_Z	BASE	All	1230	<=	1230	0	1230	<=	1230	0
SANTAFE113.0 1656 I	FTRO	All	45	<=	45	0				
SANTAFE113.0 1656_I	BASE	All					45	<=	45	0
VESTAL_166.0 649 Z	FTRO	All	61.6	<=	61.6	0				
VESTAL_166.0 649_Z	BASE	All					61.6	<=	61.6	0
WALNUT_166.0 665 Z	FTRO	All	55	<=	55	0				
WALNUT_166.0 665_Z	BASE	All					55	<=	55	0

Market 3 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
PARKER _BG OUT	GNRC	All	60	<=	60	0				

Market 4 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
BRGGSMRE69.0 4239_Z	BASE	All	97.5	<=	97.5	0				
DOW_CHEM13.0 2511_I	BASE	All	37.3	<=	37.3	0	37.3	<=	37.3	0
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EASTWOO2230. 711_Z	BASE	All	250	<=	250	0				
FRBSTNTP115. 1700 Z	FTRO	All	32	<=	32	0				
FRBSTNTP115. 1700_Z	BASE	All					32	<=	32	0
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
MOHAVE 500. 554_Z	BASE	All	825	<=	825	0	825	<=	825	0
PARKER _BG OUT	GNRC	All	60	<=	60	0				
SANTAFE113.0 1656 I	FTRO	All	45	<=	45	0				
SANTAFE113.0 1656_I	BASE	All					45	<=	45	0
TRCY_PMP230. 4109_I	BASE	All	333.8	<=	333.8	0				

Market 5 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
PARKER _BG OUT	GNRC	All	60	<=	60	0				

Market 6 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
BAF_COG113.0 3777 I	FTRO	All	45	<=	45	0				
BAF_COG113.0 3777_I	BASE	All					45	<=	45	0
BALCH__1115. 3096_Z	BASE	All					33	<=	33	0
BDLARKSP69.0 36 Z	FTRO	All	60	<=	60	0				
BRGGSMRE69.0 4239_Z	BASE	All	97.5	<=	97.5	0				
DONNELL2115. 2852 Z	FTRO	All	67.5	<=	67.5	0				
DONNELL2115. 2852_Z	BASE	All					67.5	<=	67.5	0
DRUM_5 13.0 2209_I	BASE	All	49	<=	49	0				
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EASTWOO2230. 711_Z	BASE	All	250	<=	250	0				
EXCHEQU2115. 2924_I	BASE	All					67.9	<=	67.9	0
FRBSTNTP115. 1700 Z	FTRO	All	32	<=	32	0				
FRBSTNTP115. 1700_Z	BASE	All					32	<=	32	0
GWF-PWR. 9.0 3239 I	FTRO	All	26.9	<=	26.9	0				
GWF_GT1 13.0 3189 I	FTRO	All	58	<=	58	0				
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
LLAGAS 115. 3624_Z	BASE	All	252	<=	252	0				
MOHAVE 500. 554_Z	BASE	All	825	<=	825	0	825	<=	825	0
PARKER _BG OUT	GNRC	All	60	<=	60	0				
RIOBRAVO 9.0 3439_I	BASE	All					16	<=	16	0
SANTAFE113.0 1656 I	FTRO	All	45	<=	45	0				
SANTAFE113.0 1656_I	BASE	All					45	<=	45	0
SEAWESTF 9.0 3531_I	BASE	All					20	<=	20	0
STANISL2115. 2643_I	BASE	All	56	<=	56	0	56	<=	56	0
TEMBLOR4115. 3344_Z	BASE	All	74.9	<=	74.9	0				
TRCY_PMP230. 4108_I	BASE	All	333.8	<=	333.8	0				
ULTR.PWR 9.0 3235_I	BASE	All					20.7	<=	20.7	0
WINTEC4 115. 987_Z	BASE	All					60	<=	60	0
WODLF_TP115. 1697 Z	FTRO	All	58	<=	58	0				
WODLF_TP115. 1697_Z	BASE	All					58	<=	58	0

Market 7 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
PARKER _BG OUT	GNRC	All	60	<=	60	0				

Market 8 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
BAF_COG113.0 3777 I	FTRO	All	45	<=	45	0				
BAF_COG113.0 3777_I	BASE	All					45	<=	45	0
BALCH__1115. 3096_Z	BASE	All					33	<=	33	0
BDLARKSP69.0 36 Z	FTRO	All	60	<=	60	0				
BRGGSMRE69.0 4239_Z	BASE	All	97.5	<=	97.5	0				
DRUM_5 13.0 2209_I	BASE	All	49	<=	49	0				
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EASTWOO2230. 711_Z	BASE	All	250	<=	250	0				
ESRP_MWD115. 1048_I	BASE	All					20	<=	20	0
FRBSTNTP115. 1700 Z	FTRO	All	32	<=	32	0				
GWF-PWR. 9.0 3239_I	BASE	All	26.9	<=	26.9	0				
GWF_GT1 13.0 3189 I	FTRO	All	58	<=	58	0				
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
KNGSRVR2115. 3097_Z	BASE	All					49	<=	49	0
LLAGAS 115. 3624_Z	BASE	All	252	<=	252	0				
MOHAVE 500. 554_Z	BASE	All	825	<=	825	0	825	<=	825	0
SANTAFE113.0 1656 I	FTRO	All	45	<=	45	0				
SANTAFE113.0 1656_I	BASE	All					45	<=	45	0
SEAWESTF 9.0 3531_I	BASE	All					20	<=	20	0
STANISL2115. 2643_I	BASE	All	56	<=	56	0				
TABLE_MT500. 1123_Z	BASE	All	1120	<=	1120	0				
TEMBLOR4115. 3344_Z	BASE	All	74.9	<=	74.9	0				
TEXSUN2G18.0 3467 I	FTRO	All	190	<=	190	0	190	<=	190	0
TRCY_PMP230. 4109_I	BASE	All	333.8	<=	333.8	0	333.8	<=	333.8	0
ULTR.PWR 9.0 3235_I	BASE	All					20.7	<=	20.7	0
WINTEC4 115. 987 Z	FTRO	All	60	<=	60	0				
WINTEC4 115. 987_Z	BASE	All					60	<=	60	0

Market 9 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
PARKER _BG OUT	GNRC	All	60	<=	60	0				

Market 10 Binding Constraints

Constraint	Ctg Id	Period Type	LHS	Operation	RHS	Violation Degree	LHS	Operation	RHS	Violation Degree
BAF_COG113.0 3777 I	FTRO	All	45	<=	45	0				
BAF_COG113.0 3777_I	BASE	All					45	<=	45	0
EAGLEMT3230. 1033_I	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
EAGLEMT3230. 1033_Z	BASE	All	45.02	<=	45	0.02	45.02	<=	45	0.02
FRBSTNTP115. 1700 Z	FTRO	All	32	<=	32	0				
FRBSTNTP115. 1700_Z	BASE	All					32	<=	32	0
GWF-PWR. 9.0 3239 I	FTRO	All	26.9	<=	26.9	0				
IRON_MTN230. 1038_I	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
IRON_MTN230. 1038_Z	BASE	All	16.52	<=	16.5	0.02	16.52	<=	16.5	0.02
MOHAVE 500. 554_Z	BASE	All	825	<=	825	0	825	<=	825	0
PARKER _BG OUT	GNRC	All	60	<=	60	0				
SANTAFE113.0 1656 I	FTRO	All	45	<=	45	0				
SANTAFE113.0 1656_I	BASE	All					45	<=	45	0
TRCY_PMP230. 4109_I	BASE	All	333.8	<=	333.8	0				

CALIFORNIA ISO

California Independent
System Operator

Directions for Load Serving Entities Requested to Provide Data to the California ISO in Support of the Congestion Revenue Rights Study under Market Design 2002

March 14, 2003

Table of Contents

On May 1, 2002 the California Independent System Operator Corporation (CAISO) filed tariff language to implement Phase I of its Comprehensive Market Design Proposal[1] (MD02) with the Federal Energy Regulatory Commission. This filing, which addresses deficiencies in the CAISO market, was followed by a second tariff filing on June 17, 2002 necessary to implement Phases II and Phase III[2] of MD02.

Phase III of the MD02 proposal includes new forward congestion management design elements with a locational marginal pricing (LMP) scheme and a full network model. Also included in Phase III is a Congestion Revenue Right (CRR) element featuring Point-to-Point CRRs (both Obligations[3] and Options[4]) and Network Service Rights (Obligations only) which offer market participants the opportunity to hedge against congestion charges in the forward market.

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[1] This filing is located on the CAISO website at http://www.caiso.com/docs/2001/12/21/2001122108490719681.html

2 This filing is located on the CAISO website at http://www.caiso.com/docs/2002/05/29/200205290858531076.html

[3] A CRR Obligation owner receives a payment from the CAISO when the difference in the congestion component of the locational marginal price in the day ahead market is positive and the CRR Obligation owner pays when it is negative. The congestion component for a Point-to-Point Right is calculated by multiplying the scheduled megawatt quantity by the difference between the locational marginal price at the takeout point (point of ejection) and the locational marginal price at the point of injection. The congestion component for a Network Service Right Obligation is the difference of the product of the scheduled megawatt quantities at each takeout point by the corresponding locational marginal prices and the scheduled megawatt quantities at each point of injection by the corresponding locational marginal prices.

[4] A CRR Option owner receives a payment from the CAISO when the difference in the congestion component of the locational marginal price in the day ahead market is positive and pays nothing when it is negative.

CRRs will be released to Market Participants (MPs) through direct allocations and through periodic (yearly and monthly) auctions beginning in 2004. While Existing Contracts (i.e., Existing Transmission Contracts or "ETCs") will be honored under the new CRR market redesign proposal to the extent possible, those Existing Contract holders wishing to convert will receive CRRs Options (or Obligations, if desired).

The purpose of this data request is to gather important information from certain Load Serving Entities, referred to herein as "Allocation Eligible Entities" (AEEs), who may be entitled to receive CRR allocations under MD02. This information, which will be kept confidential by the ISO, will be used in a CRR Study being conducted by the CAISO. Results of this Study will provide the CAISO and Market Participants with valuable information about the extent to which AEEs may be hedged against congestion charges in the forward market under the new LMP environment.

For purposes of the CRR Scoping Study, AEEs are defined as follows:

> "Any Market Participant (or duly designated agent of such an entity, including, e.g., a Scheduling Coordinator), including a load aggregator or power marketer, (1) serving End Users within the ISO Control Area or (2) that has been granted the authority or has an obligation pursuant to California State or local law, regulation or franchise to sell electric energy to End Users located within the ISO Control Area."

The ISO participated in a series of meetings with Market Participants, at the end of last year, to discuss implementation of LMPs and CRRs. During these working group meetings, Market Participants made several recommended changes to the ISO's June 17, 2002 Tariff filing on CRR implementation. One of the recommendations was to implement annual CRR terms with a rolling three-year allocation period. Another recommendation was to offer peak and off-peak CRRs. A third was to allocate CRR Obligations to AEEs based upon the 0.5% exceedance level of the load duration curve (i.e., on the peak load side of the load duration curve) rather than at the 99.5% exceedance level. The ISO believes these recommendations have merit. For this reason, data requested for purposes of the CRR Study reflect these anticipated changes to the current Tariff filing.

The CAISO requests that all AEEs provide a request[5] of CRR needs for annual peak and off-peak periods and for monthly peak and off-peak periods over the requested time frame. The quantity of requested annual peak and off-peak CRRs should cover the period June 1, 2003 through May 31, 2004. The quantity of requested monthly peak and off-peak CRRs should cover the months of June 2003, August 2003, November 2003 and March 2004. <u>All requests for annual and monthly CRRs should be supported by historical and forecasted load data, respectively. Requests and supporting data should be provided by AEEs to the CAISO in the specific format specified in the templates that accompany this data request.</u> Note that the historical load and forecasted load should not account for any losses associated with the transmission of the power to the load. For purposes of the Study, data to support the annual CRR requests should be provided for the period of January 1 through December 31, 2002[6]. Data to support the requests for monthly peak and off-peak CRRs should be based upon those four months listed above.

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[5] AEEs are not bound in the future by the requested quantity of CRRs provided to the CAISO as part of the CRR Study. AEEs will again be asked for the quantity of needed CRRs this summer prior to implementation of new LMP energy market under MD02.

[6] The CAISO recognizes that some AEEs may wish to refine their request for CRRs using some other criteria or information. The ISO is willing to discuss with AEEs, at a later time, other possible means of supporting CRR requests in the future.

Overview

The data-gathering and validation process consists of the following steps.

Each AEE must submit to the CAISO its requested quantity of annual and monthly CRRs using the

Data Gathering and Validation

templates provided. Specific Sinks and Sources must be specified that indicate the transmission usage pattern for which the CRRs will provide a hedge. These CRRs must be Point-to-Point (PTP)[7] CRRs. The CAISO will provide the option for AEEs to request Network Service Rights (NSR)[8] CRRs in the future and this includes the start of Phase III of MD02, but at the moment the CAISO does not have the software available to handle NSR CRR. Thus, for this study, only PTP CRRs can be requested.

As previously mentioned, each AEE must submit historical load data, in template format, to support its CRR requests. The CAISO will review the quantity of CRRs requested and the supporting data provided by each AEE. The CAISO will also review historical data on file and consider any non-converted and converted ETCs[9] (i.e., FTRs) held by the AEE for the period of the CRR term requested. ETCs and FTRs held by AEEs will effectively reduce the quantity of CRRs that may be allocated to AEEs under the Study.

If the quantity of requested CRRs for the particular term cannot be supported by data that is provided by the AEE, the CAISO will notify the AEE and will request the AEE to resubmit a revised requested of CRRs.

CRR requests that pass the CAISO validation process will be utilized in the simultaneous feasibility analysis performed as part of the allocation process. Please note that CRRs found to be simultaneously feasible may be less than the quantity of CRRs requested by the AEE. (Refer to the CAISO white paper entitled "Congestion Revenue Rights Allocation and Auction" for additional information.)

Determination of Maximum Quantity of Allocated CRRs

The maximum quantity of annual CRRs that will be allocated to AEEs for purposes of the Study will be based upon the determined Load Metric[10] for each AEE, plus the quantity of non-converted and converted ETCs.

However, for purposes of this Study, the supporting data should fall within the January 1 thorough December 31, 2003 time frame.

7 PTP CRRs consist of a balanced power transfer from a Source to a Sink. The Source for PTP Rights, for purposes of this Study, must be a network node designated by a specific Resource ID or a Trading Hub. The Sink for PTP Rights must be a Load Aggregation Point. Load Aggregation Points are CAISO defined Load Aggregation Points (i.e., Standard Load Aggregation Points). Similar to the NSR, the SFT used in the allocation of PTP Rights will be on a priority level basis.

8 NSRs generalize the Point-to-Point Right by allowing multiple Sources and Sinks to be specified (i.e., a NSR is multipoint-to-multipoint right). A NSR specifies MW quantities at each of a group of Sources and Sinks, such that the total MW quantity over all Sources equals the total MW quantity over all Sinks. Market Participants that hold a NSR shall be entitled to the difference in the LMPs between the multiple Sources and Sinks, multiplied by the respective awarded quantities. From the CRR auction perspective, each Source and Sink has its own price and quantity for purposes of bidding into the CRR Auction. The optimization process will determine the actual percentages of the total MW cleared that corresponds to each Source and Sink Point. This price and quantity is generally the same for the allocation process, except that from the allocation perspective, the SFT will be performed on a priority level basis.

9 Some Market Participants who turned over operational control of their transmission systems to the CAISO were given FTRs of a certain term in exchange.

10 The Load Metric is the load level that is only expected to be equaled or exceeded 0.5 percent of the time based upon historical information. See Appendix for a sample load duration curve and determination of the 0.5 percent exceedence level.

Similarly, the maximum quantity of monthly CRRs that will be allocated to AEEs for the purpose of this study will be based upon the Load Metric, plus the quantity of non-converted and converted ETCs. However, forecasted[11] load data will be submitted by the AEE, instead of historical load data, and will be the basis used to determine the Load Metric.

For the annual allocation, 75% of the Load Metric (first discounted by non-converted and previously converted ETCs) will be used as the maximum value for the annual allocation. For the monthly allocations, 100% of the Load Metric (first discounted by non-converted, previously converted ETCs and the CRRs allocated for the annual term) will be used as the maximum value for the monthly allocations. Please note that the data template contains macros that determine 75% of the Load Metric for yearly term CRRs and 100% of the Load Metric, less CRRs allocated to the AEE for the annual term, for the monthly term. AEEs that have non-converted or previously converted ETCs should provide this information to the ISO as a separate data submittal.

Source and Sink Data

For each CRR term (annual or monthly) that the AEE requests CRRs, the transmission usage pattern associated with these CRRs must be provided to the CAISO in order for the simultaneous feasibility test (SFT) to be performed. This transmission usage pattern is described by Sink and Source locations, as well as, the amount of MWs associated with each.

Sink and Source Specification

In the allocation of CRRs to AEEs, certain criteria must be met for the Sources and Sinks that the AEEs use in their request of CRRs. The list of Sources and Sinks that can be used by the AEEs is provided in the template.

Network Nodes, Standard Load Aggregation Points and Trading Hubs

For this Study, the CAISO will use an updated full network model. Based on this model, a list of network nodes, Standard Load Aggregation Points, and Trading Hubs comprising the model has been developed. This list includes Load Distribution Factors (LDFs)[12] for each Standard Load Aggregation Point and Trading Hub as well as a mapping from current CAISO Resource ID names and takeout points to network nodes.

Sinks

Sinks must be a CAISO defined Standard Load Aggregation Point. The Standard Load Aggregation Points that will be used for this Study are PGE3, PGE4, SCE1, SDG1, CWR4, CWR5, CWR6, and CWR7.

The definitions of these Points are given in Table 3 in the Appendix. This table presents the original definitions of Standard Load Aggregation Points that were filed in the May 1, 2002 filing[13], as well as, an addition column that lists the Standard Load Aggregation Points that must be used for this CRR study. The use of the Standard Load Aggregation Points, CWR4, CWR5, CWR6 and CWR7, is restricted to the California Department of Water Resources (CDWR) for use as a Sink. The use of the remaining four Standard Load Aggregation Points, PGE3, PGE4, SCE1 and SDG1 is restricted to all other AEEs.

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[11] For the purpose of this Study, the standard that should be used by AEEs for the monthly load forecast is 1-in-2. That is, there is a 50% chance that the actual load will exceed the forecast and a 50% chance that the actual load will be less than the forecast.

[12] LDFs are the mechanism used to distribute aggregate load to the underlying load nodes.

[13] See page 124 of the CAISO's May 1, 2002 Comprehensive Market Design Proposal

For the purposes of this allocation process, the Sink may not be a Trading Hub (since load cannot be scheduled in the forward market at a Trading Hub). For the purposes of this study (and not necessarily for the actual CRR allocation), the Sink cannot be a Customer Load Aggregation Point[14].

Besides the restriction on the available Standard Load Aggregation Points that the AEE is allowed to use in this study, the AEE is further restricted in that it can only use those Standard Load Aggregation Points that contain load for which the AEE is responsible (see definition of an AEE).

For example, if an AEE has load in PGE3 and SCE1, then it cannot use PGE4 or use SDG1 as Sink points.

Sources
Sources must be generation points or scheduling points for imports (defined by Resource IDs), or Trading Hubs.

If the AEE is requesting Sources, other than Trading Hubs, the CAISO requests that the AEE specify those Sources that most accurately define their typical transmission usage pattern. In other words, specify the Sources as those sources that the AEE owns and will operate to serve its load on a regular basis and those sources that are part of the AEE's energy contract portfolio. These sources will include generators and imports.

Multiple Requests for CRRs

The AEE can submit more than one request for CRRs for a particular term. However, the total quantity of CRRs requested must be less than or equal to the maximum quantity of CRRs allocated to AEEs.

Definition of Peak and Off-peak Periods

For purposes of the Study, the definition of the peak period is from Hour Ending 7 through Hour Ending 22 (i.e., 6 AM to 10 PM) Monday through Saturday. The definition of the off-peak period is from Hour Ending 23 through Hour Ending 6 (i.e., 10 PM to 6 AM) Monday through Saturday as well as HE 1 to HE 24 (i.e., all day) on Sundays. For the following holidays, all hours of the day are treated as off-peak: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

Templates for Requesting CRRs

Following is a description of the Excel spreadsheet templates provided by the CAISO along with this document. Tables 1 and 2 provide a description of data requested in the templates provided by the ISO. Table 1 shows information provided in the Source tab of the template and Table 2 shows information provided in the Sink tab of the template.

Standardized Sink Names

The "Standardized Sink Names" tab of the Excel spreadsheet provides information to be used by the AEE when indicating the specific Sink or Sinks for requested CRRs in the Sink data template.

Resource ID Source Names

The "Resource ID Source Names" tab of the Excel spreadsheet provides information to be used by the AEE when indicating the specific Source or Sources for the requested CRRs in the Source data template. Note that this list is comprised on generator resource names, tie-point resource names and trading hub names. The generator and tie-point resource names are taken from the" Take Out Points, Network Model, and Load Groups (effective date 1/1/2003, New PTO Implementation)" file that is posted on the CAISO website. The Trading Hub names are taken from Table 3 in the appendix.

[14] The use of Customer Load Aggregation Points at this time may slow down the request for data from the AEEs.

Historical Load Data

The "Historical Load Data" tab of the Excel spreadsheet provided the location for AEEs to provide historical hourly load data from January 1, 2002 through December 31, 2002. This information should support the quantity of CRRs being requested by the AEE. At the top of this spreadsheet is a location for the AEE to indicate its company name. A macro is included that calculates 75% of the Load Metric. This represents the maximum annual term CRRs that may be requested by the AEE.

Forecasted Load Data

The "Forecasted Load Metric" tab of the Excel spreadsheet provides the location for AEEs to specify their forecasted hourly load data for the months of June 2003, August 2003, November 2003 and March 2004. These forecast data sets should be supported by the historical hourly load data provided in the Historical Load Data template for the same monthly time period. A macro is included in the template that calculates the monthly load metric, less the quantity of yearly term CRRs. This represents the maximum monthly term CRRs that may be requested by the AEE.

Source Data

The "Source Data" tab of the Excel spreadsheet provides the location for AEEs to fully describe the Sources that correspond to the requested on and off-peak yearly and monthly (includes all the requested four months) PTP CRRs. Definitions of the terms that apply to the Source template are described in Table 1 below.

Table 1

Company name of the Allocation Eligible Entity (AEE):	The name of the Allocation Eligible Entity.
Resource ID **Source Name:**	Each source name used must be one of the Resource ID (Source) Names found in the "Resource ID (Source) Name" tab in the accompanying template.
CRR ID:	This ID serves two purposes. The first is to establish a link between the Source data and the corresponding Sink data if more than one set of CRR requests are made by the AEE for the particular term and time-of-use period. The second is to indicate the quantity of requested PTP CRRs. If the AEE has *n* different PTP CRR requests, then the AEE must number each set of Sink/Source requests with the CRR Id as 1, 2, …, *n*.
SourceMW:	This MW value should match the corresponding Sink MW value for this PTP CRR request.

Sink data

The "Sink Data" tab of the Excel spreadsheet provides the location for AEEs to fully describe the Sinks that correspond to the on and off-peak yearly and monthly[15] requested PTP CRRs. Definitions of the terms that apply to the Sinks template are described in Table 2 below.

Table 2

Company name of the Allocation Eligible Entity (AEE)	The name of the Allocation Eligible Entity.
Sink Name:	This must be the name of a CAISO defined Load Aggregation Point name. Consult the "Standardized Sink Names" tab in the template.
CRR ID	See Table 1 description.
SinkMW:	This MW value is the CRR requested MW for this PTP CRR.

Sample Data Submittal

The Excel data template provided by the CAISO with these instructions provides sample data submittal information.

[15] Includes requests for all four months as previously described.

Example of Determining the 0.5% Load Level (Load Metric)

Appendix

The following is an example of a gross load duration curve that points out the 0.5% load level.

Assume that the gross load duration curve in Figure 1 is for a particular month in the one-year historical reference period and shows the gross load levels for AEE1's entire load during that monthly period. Assume that this gross load is based on hourly-metered data. For this month, the maximum load is 1981 MW and the minimum load is 893 MW.

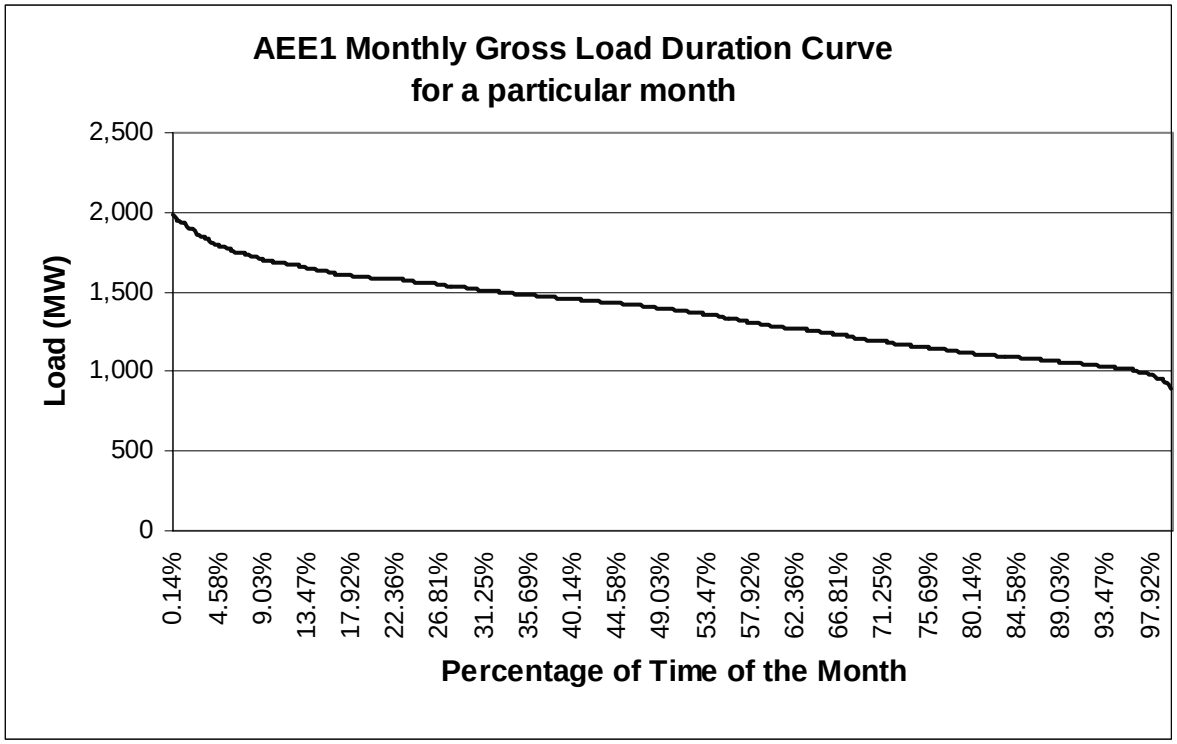

Figure 1 Gross load duration curve for AEE1

To see the 0.5% point, the upper right portion of this graph is expanded in Figure 2.

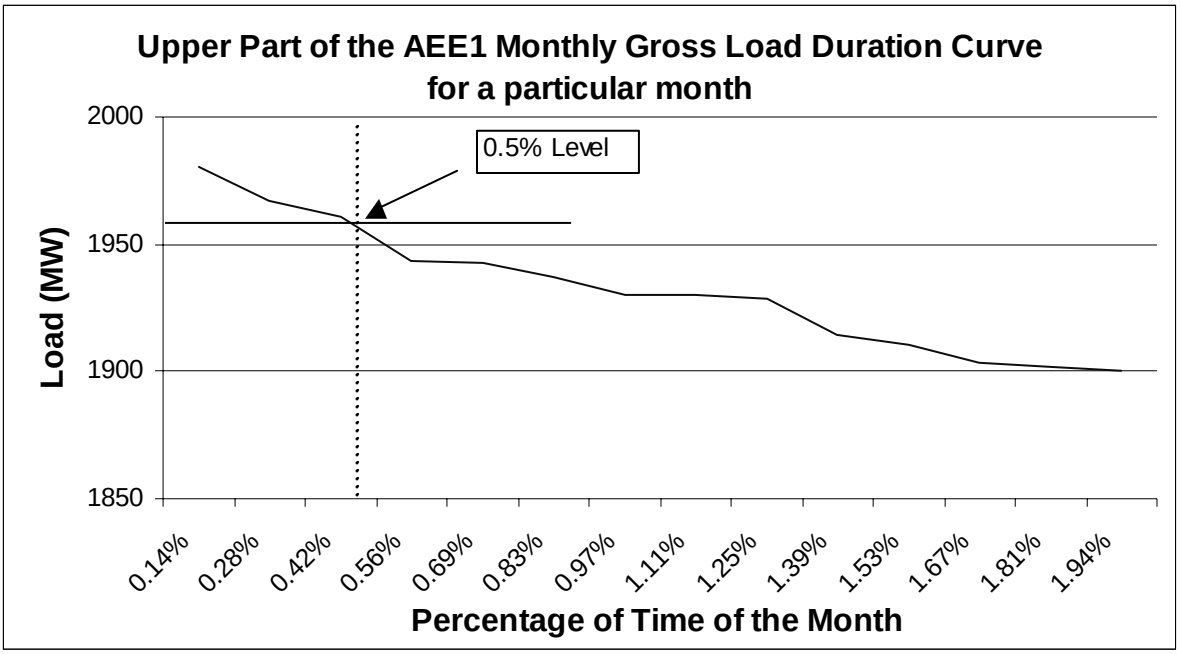

Figure 2 Gross load duration curve for AEE1 with 0.5% point shown

The load at the 0.5% level is 1955 MW (which is 98.7% of the peak load, i.e., 1955/1981). This value of 1955 will be compared against all other similar 0.5% values from the other months in the historical reference period and the minimum value will be used as the Load Metric in determining the maximum quantity of requested CRRs permissible. This quantity will then be used in the Simultaneous Feasibility Test to determine the final allocated CRR quantity for use by the AEE.

Table 3

Trans-mission Area	Trading Hub	Load Aggregation Points to be Used as Sinks in the CRR Study	May 1, 2002 Filed Load Aggregation Points (Initial Definition)		Name and Correspondence to Existing Load Groups
PGAE	NP15	**PGE3**	PGE3	*PGHB*	*Humboldt (PG&E Humboldt/ PGHB) (current PGE1 demand zone)*
				PGSF	*San Francisco (PG&E San Francisco/ PGSF and PG&E Peninsula North/ PGP1) (current PGE2 demand zone)*
				PGDI	*Diablo (PG&E Diablo/ PGDI)*
				PGEB	*East Bay (PG&E East Bay/ PGEB)*
				PGMS	*Mission (PG&E Mission/ PGMS)*
				PGSJ	*San Jose/ Peninsula (PG&E De Anza/ PGDA, PG&E Peninsula South/ PGP2, and PG&E San Jose/ PGSJ)*
				PGF1	*Fresno (PG&E Fresno North/ PGF1, and part of PG&E Yosemite/ PGYO)*
				PGNC	*North Coast (North Bay LPA portion of PG&E North Coast/ PGNC)*
				PGFG	*Fulton Geysers (Fulton Geysers LPA portion of PG&E North Coast/ PGNC)*
				PGBC	*Battle Creek LRA (RMR area in PG&E North Valley/ PGNV)*
				PGSI	*Sierra LRA (RMR area in PG&E Sierra/ PGSI and parts of PG&E Sacramento/ PGSA)*
				PGST	*Stockton LRA (RMR area in PG&E Stockton/ PGST and Stanislaus/ PGSN)*
				PGNB	North Bay (PG&E North Bay/ PGNB, and remaining portion of PG&E North Coast/ PGNC)
				PGNV	North Valley (remaining portion of PG&E North Valley/ PGNV)
				PGSA	Sacramento Valley (remaining portions of PG&E Sacramento/ PGSA and Sierra/ PGSI)
				PGSN	San Joaquin (remaining portions of PG&E Stockton/ PGST, PG&E Stanislaus/ PGST, and PG&E Yosemite/ PGYO)
				PGCC	Central Coast (PG&E Central Coast/ PGCC)
				CT1	California Oregon Transmission Project
				CSF1	City of San Francisco
			LMD1	LMD1	Lassen Municipal Utility District
			MID1	MID1	Modesto Irrigation District
			NCP1	NCP1	Northern California Power Agency (includes City of Santa Clara)
			RED1	RED1	City of Redding
			SMD1	SMD1	Sacramento Municipal Utility District
			TID1	TID1	Turlock Irrigation District
			WAP1	WAP1	Western Area Power Administration
		CWR4	CWR1	CWR1	California Dept. Of Water Resources
				CWR4	California Dept. Of Water Resources
	ZP26	**PGE4**	PGE4	PGLP	Los Padres (PG&E Fresno South/ PGF2, PG&E Kern/ PGKE, and PG&E Los Padres/ PGLP)
			NCP2	NCP2	Northern California Power Agency
		CWR5	CWR2	CWR2	California Dept. of Water Resources
				CWR5	California Dept. of Water Resources
SCE	SP15	**SCE1**	SCE1	SCSO	*LA/ Orange County (SCE South/ SCSO)*
				SCEA	Other SCE (SCE East/ SCEA, SCE High Desert/ SCHD, SCE North/ SCNO, SCE Sylmar/ SCDC, and SCE West/ SCWE)
			ANA1	ANA1	City of Anaheim
			PAS1	PAS1	City of Pasadena
			RVD1	RVD1	City of Riverside
			VRN1	VRN1	City of Vernon
			Other ...	Other ...	Load Groups for other municipal utilities?
		CWR6	CWR3	CWR3	California Dept. of Water Resources
				CWR6	California Dept. of Water Resources
		CWR7	CWR7	CWR7	California Dept. of Water Resources
SDGE		**SDG1**	SDG1	*SDG1*	*San Diego Gas and Electric*

Appendix B

ALSTOM ESCA CRR Software System Features

This document outlines the key features of ALSTOM ESCA's CRR system that was used in the CAISO's CRR study. This is not an exhaustive list, but it contains some of most important features of the Alstom's CRR software system.

- **A Complete CRR System with Full Range of Support Applications**

  ALSTOM ESCA's CRR system is a fully functional system with all required support applications. These include market database, market user interface, market operator interface and market clearing engine. It is currently used at PJM.

- **Ability to Model Loop Flows**

In all interconnected systems some part of the network capacity is consumed by the neighbor's flow through the system. This flow reduces the line limits available for CRR studies. A complete CRR system must have capability to model these flows. Alstom's CRR system can model loop flow and consider their effect on CRR allocations and auctions. These flows are modeled as fixed injection/withdrawals in operator-selected nodes of the system to produce a network condition that is closer to reality.

Ability to Model Pre-existing CRRs

Per the CAISO's proposed MD02 design, there are situations in which new CRRs need to be auctioned off when pre-existing CRRs are present in the system. These CRRs could have originated from a previous auction or from conversion of grand-fathered rights in the system. The pre-existing CRRs consume network capacity and need to be modeled to ensure feasibility of the allocation and auction process. ALSTOM ESCA's system has the capability to model these kinds of CRRs along with new CRR bids.

- **Ability to Auction a Percentage of Network Capacity**

Sometimes in CRR auctions, it is desired to auction off only a percentage of the network capacity. For example the proposed CAISO CRR design calls for a 75 percent annual allocation of CRRs to LSEs and an allocation of the remaining CRRs in a monthly auction. This function is supported by ALSTOM ESCA's CRR system.

Support for Secondary Trading

Participants who own a CRR might want to trade it in the secondary market. This can be done in two ways, through an auction or through bi-lateral trading. Both of these secondary trade types are supported by ALSOM ESCA's CRR system. A participant can post its desire to sell a CRR through the Market User Interface (MUI). The other option is to sell the CRR through the auction. In that case the participant enters an offer price and the auction will clear the market (including the CRR offer) to maximize the CRR market value.

- **LP-based Security-constrained CRR Market Clearing Engine**

The CRR market clearing engine the CAISO used for the study deploys a Linear Programming (LP) model. The problem is solved in such a way to yield the highest CRR market value subject to applicable constraints. These constraints can be any type of constraint that can be modeled in a mathematical linear form. They include, but not limited to, security constraints (both base case and contingency) and interface constraints. Solving the CRR problem in this form ensures the highest market benefit while respecting system constraints (to ensure revenue adequacy).

- **Ability to Allocate/Auction On-peak and Off-peak FTRs**

ALSOM ESCA's CRR system can support two classes of CRRs, on-peak and off-peak. These are two independent classes and capacity from one cannot be used in the other class. This will enable the CAISO to allocate/auction CRRs for two types of system conditions.

- **Interface to Outage Scheduling Subsystem**

ALSTOM ESCA's CRR system has an interface to the outage scheduling subsystem to incorporate the most valid network topology for the time of study.