



Competitive Path Assessment

Dan Yang, Ryan Kurlinski
and Eric Hildebrandt

Department of Market Monitoring

Market Surveillance Committee Meeting
January 22, 2010

Background

- DMM required to perform CPA on seasonal basis starting in second year of new market design
 - April 1, 2010 → Q2 2010 designations (April – June)
 - Only constraints with 500 hours of congestion in previous 12 months are “candidate paths” under tariff.
- FERC has expressed concern that 3 pivotal supplier test in CPA may be overly stringent, and directed MSC to examine “whether an alternative competitive screen to identify market power opportunities for generation in load pockets should be considered” within first 12 months of new market design, and report findings in one of the ISO’s quarterly reports (Sept 21, 2006 Order, PP 1032)

Overview

- Review analysis by DMM:
 - Frequency/impact of mitigation
 - Residual Supplier Index (RSI) analysis
 - Updated white paper with results for April – Dec 2009
- Review CPA Methodology and Issues
 - Determining Candidate Paths
 - Minimum 500 hour threshold
 - Practical issues/initial screening results
 - Other Issues
 - Transmission de-rates
 - Dynamic nature of constraints
 - Software issues
 - Seasonal updates

Residual Supply Index (RSI)

- RSI is for each congested constraint
- For i -th congestion
 - ❖ Shift Factor $SF(k,i)$: resource k 's shift factor on i -th congestion
 - ❖ Schedule $MW(k)$: resource k 's output (Energy)
 - ❖ $P_{max}(k)$: resource k 's maximum output
- Dispatched counter flow of resource k for $SF(k,i) < 0$:
$$D_CFlow(k) = SF(k,i) * MW(k)$$
- Counter flow supply of resource k for $SF(k,i) < 0$:
$$S_CFlow(k) = SF(k,i) * P_{max}(k)$$

Residual Supply Index (RSI)

- Total dispatched counter flow from market participant **P**

$$D_CFlow(\mathbf{P}) = \sum D_CFlow(k) \text{ where } k \text{ belongs to } \mathbf{P}$$

- Total dispatched counter flow from all resources

$$Total_D_CFlow = \sum D_CFlow(k) \text{ for all } k$$

- Total counter flow supply from all resources

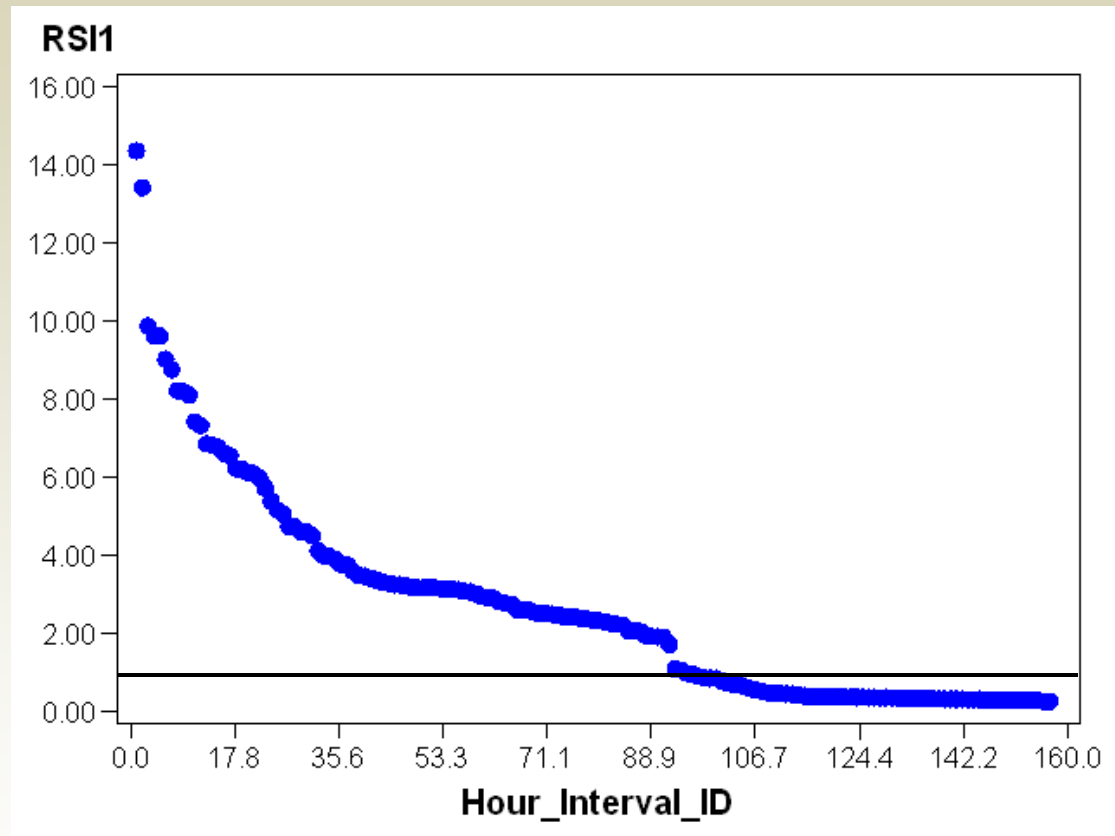
$$Total_S_CFlow = \sum S_CFlow(k) \text{ for all } k$$

$$RSI(0) = \frac{Total_S_CFlow}{Total_D_CFlow} = \frac{\sum_k S_CFlow(k)}{\sum_k D_CFlow(k)}$$

Pivotal Residual Supply Index (RSI)

- $RSI(1) = \frac{Total_S_CFlow - S_CFlow(P1)}{Total_D_CFlow}$
- $RSI(2) = \frac{Total_S_CFlow - S_CFlow(P1) - S_CFlow(P2)}{Total_D_CFlow}$
- $RSI(3) = \frac{Total_S_CFlow - S_CFlow(P1) - S_CFlow(P2) - S_CFlow(P3)}{Total_D_CFlow}$

Sample RSI Results



EDR_FLOWGATE_NAME=24074_LA FRESA_230_24065_HINSON _230_BR_
1_1 MKT_TYPE=DA SCUC_PASS_TYPE_TEXT=IFM

Screening Candidate Paths

- Pre-MRTU (Q1 2009)
 - OOS/OOM
 - RMR

- Post MRTU (Q2-Q4 2009)
 - Hours of congestion (LMPPM, IFM + RTM)
 - Exceptional Dispatches
 - Inc/Dec energy (vs. unit commitments)
 - Mapping ED reasons to identify potentially managed constraints
 - RMR

Hours of Congestion – Non-competitive paths

CONSTRAINT_NAME	Cong. Hours	Avg. Flow	<-- Congested Hours -->			
			LMPM	IFM	LMPM	RTD
24074_LA FRESA_230_24065_HINSON_230_BR_1_1	431	601	252	157	261	263
VICTVL_BG	365	2,508	141	119	193	102
LOSBANOSNORTH_BG	327	2,027	99	107	184	206
24082_LCIENEGA_230_24074_LA FRESA_230_BR_1_1	269	699	217	92	13	31
SCE_PCT_IMP_BG	218	6,577	149	153	28	19
32212_E.NICOLS_115_32214_RIO OSO_115_BR_1_1	210	56	163	169	10	20
30875_MC CALL_230_30880_HENTAP2_230_BR_1_1	128	380	91	34	19	15
31482_PALERMO_115_32280_E.MRY J2_115_BR_1_1	121	78	89	102	3	5
30543_ROSSTAP1_230_30550_MORAGA_230_BR_1_1	119	379	48	47	37	64
32218_DRUM_115_32222_DTCH2TAP_115_BR_1_1	101	73	90	93	30	37
30250_CARIBOU_230_30261_BELDENTP_230_BR_1_1	91	225	87	5	16	17
30055_GATES1_500_30060_MIDWAY_500_BR_1_3	80	1,885	69	67	5	8
30105_COTTNWD_230_30245_ROUND MT_230_BR_3_1	74	257	55	52	3	14
958555/958556 Flow Limit #6	63	25	8	15	47	2
1051307-SOL3	61	130	22	24	57	4
BARRE-LEWIS_NG	51	1,470	32	37	9	1

Excludes Constraints with < 50 hours of congestion.

Hours of Congestion – Candidate Paths Deemed as Competitive in 2009

CONSTRAINT_NAME	Cong. Hours	Avg. Flow	<-- Congested Hours -->			
			LMPM	IFM	LMPM	RTD
IVALLYBANK_XFBG	483	900	85	95	335	443
HUMBOLDT_BG	468	43	149	166	216	228
SDGE_CFEIMP_BG	349	2,321	65	121	187	270
SDGEIMP_BG	205	2,106	85	98	68	92
33206_BAYSHOR1_115_33208_MARTIN C_115_BR_1_1	142	136	102	61	15	12
33205_HNTRS PT_115_33208_MARTIN C_115_BR_3_1	89	124	65	72	2	8
33252_POTRERO3_20.0_33204_POTRERO_115_XF_G3	43	195	19	37	3	1
33203_MISSON_115_33204_POTRERO_115_BR_1_1	34	125	17	3	14	11
MIGUEL_IMP_BG	31	1,900	22	28		
SSONGS_BG	22	1,520	6	3	15	20
31000_HUMBOLDT_115_31001_HMBLTM_1.0_XF_1	17	46	6	3	7	9
T-133_RAVENSWDSANMAT_NG_SUM	13	115	6	2	1	
33204_POTRERO_115_33206_BAYSHOR1_115_BR_1_1	13	87	2	1	6	6
33205_HNTRS PT_115_33208_MARTIN C_115_BR_1_1	5	110	1		1	3
33207_BAYSHOR2_115_33208_MARTIN C_115_BR_2_1	5	125	3	3	1	1
33253_POTRERO4_13.8_33204_POTRERO_115_XF_14	1	59				1
33255_POTRERO6_13.8_33204_POTRERO_115_XF_16	1	59				1
33254_POTRERO5_13.8_33204_POTRERO_115_XF_15	1	52			1	
99100_PIT-ESH1_230_30527_PITSBRG_230_BR_1_1	1	456			1	1
33208_MARTIN C_115_33310_SANMATEO_115_BR_3_1	1	196				1
33204_POTRERO_115_33207_BAYSHOR2_115_BR_2_1	1	129			1	1
MIGUEL_BKs_MXFLW_NG	1	1,800				

Exceptional Dispatch Hours by Reason (April-December 2009)

Reason	Inc	Inc or Dec	Inc or Commitment	Inc, Dec or Commitment
Transmission Outage PG&E	317	1,931	1,092	2,453
Ramp Rate	1,425	1,442	1,470	1,470
T-138	961	1,002	1,365	1,425
Software Limitation	328	557	785	1,870
T-129	349	369	394	762
Transmission Outage SCE	212	274	2,029	2,110
Other	104	193	709	813
T-132	55	178	81	204
Transmission Outage SDGE	174	174	1,404	1,408
Region Reliability	119	125	316	328
System Capacity	79	81	1,200	1,200
T-135	58	71	269	282
G-206	70	70	2,056	2,056
T-165	16	51	49	51
G-217	47	47	1,294	1,294
T-154	4	47	16	47
Path 26	25	46	328	359
T-170	30	30		49
T-103	22	22	664	664
T-133	19	21	20	22
G-219	16	16	1,751	1,751
NP26 Capacity	11	11	13	13
SP26 Capacity	10	10	2,707	2,707
T-151		6	4	6
T-167		4		4
G-233		2	106	108
T-137			35	35
T-144			2	2

Transmission and Generation Procedures: Number of Potentially Managed Constraints

ED Reason	Potentially Managed Constraints	Inc	Inc or Dec	Inc or Commitment	Inc, Dec or Commitment
T-138	13	961	1,002	1,365	1,425
T-129	36	349	369	394	762
T-132	39	55	178	81	204
T-135	7	58	71	269	282
G-206	6	70	70	2,056	2,056
T-165		16	51	49	51
G-217		47	47	1,294	1,294
T-154		4	47	16	47
T-170		30	30		49
T-103	29	22	22	664	664
T-133		19	21	20	22
G-219		16	16	1,751	1,751
T-151			6	4	6
T-167			4		4
G-233			2	106	108
T-137				35	35
T-144				2	2

Comparison Average Flow During Congested Hours to CRR Rating of Selected Paths

Paths Currently Deemed Non-competitive

CONSTRAINT_NAME	Cong. Hours	Avg. Flow	CRR Rating
24074_LA FRESA_230_24065_HINSON_230_BR_1_1	431	601	797
VICTVL_BG	365	2,508	2,400
LOSBANOSNORTH_BG	327	2,027	5,400
24082_LCIENEGA_230_24074_LA FRESA_230_BR_1_1	269	699	643
32212_E.NICOLS_115_32214_RIO OSO_115_BR_1_1	210	56	96

Comparison Average Flow During Congested Hours to CRR Rating of Selected Paths

Paths Currently Deemed Competitive

CONSTRAINT_NAME	Cong. Hours	Avg. Flow	CRR Rating
IPPCADLN_BG	1,650	610	647
IVALLYBANK_XFBG	483	900	900
HUMBOLDT_BG	468	43	43
SDGE_CFEIMP_BG	349	2,321	2,850
SDGEIMP_BG	205	2,106	2,850
33206_BAYSHOR1_115_33208_MARTIN C_115_BR_1_1	142	136	144
Grandfathered Paths			
IPP-IPPGEN_MSL	339	470	470
WSTWGMEAD_MSL	321	174	186
MKTPCADLN_MSL	179	589	630
ADLANTOSP_MSL	136	1,213	1,296

Modeling Issues

- Currently using Plexos
 - Need to use new version to include contingencies
 - Still extremely time consuming to map/load CRR model and run scenarios

- Developing PROBE model for use later in 2010
 - Awaiting tool to export fully mapped PSS/E file from actual IFM model that can be directly loaded into PROBE
 - By mid2010, may be able to run CPA based on “snapshot” of actual IFM very quickly (e.g. days?)
 - This would allow much more frequent updating of CPA based on actual system conditions.