California Independent
System Operator Corporation

Competitive Path Assessment for 2012 Release 2

Department of Market Monitoring

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TABLE OF CONTENTS

1 Executive summary

The competitive path designations resulting from the competitive path assessment (CPA) are used to establish the set of transmission paths applied in the two market passes where local market power mitigation (LMPM) is applied. A description of the complete CPA procedure is provided in a previous white paper for initial competitive path designations.[1] Starting in April 2010, path designations are applied seasonally, at least four times per year.

This white paper provides updated information on the CPA procedure, and the set of competitive path designations that will be the release 2 for 2012. The effective date will be released in a market notice.

This current release of CPA results evaluates path competitiveness across three load scenarios (high, medium, and low), three hydroelectric production scenarios (high, medium, and low), and combinations of the ten largest suppliers' internal generation withdrawn from the model. The general methodology remains the same, with updates on transmission network model, candidate path list, and input data.

Results show that all but five candidate paths pass the test and will be deemed competitive for purposes of local market power mitigation procedures. Non-candidate paths are deemed non-competitive by default except for "grandfathered" paths (existing branch groups).

Changes in the simulation condition relative to the prior study include:

- The full network model is based on the default full network model version DB57 as well as monthly release congestion revenue rights (CRR) model for June 2012.
- Pivotal suppliers' capacities are adjusted based on the latest tolling agreement survey (December 2011) covering January to December 2012 from major generation companies and load serving entities.
- The candidate path list is updated based on 12 months of operating data from May 2011 to April 2012.
- Generator outages for San Onofre Nuclear Generating Station (SONGS) unit 2 and 3 are added in the model, and Huntington Beach units 3 and 4 are modeled as back to service.

The ISO is implementing a new competitive path assessment methodology (dynamic competitive path assessment) which will be phased in 2012 and gradually replace the current competitive path assessment[2]. The first phase is already implemented for day-ahead market in April 2012, and the real-time market implementation is scheduled for the second phase. Once the dynamic competitive path assessment is implemented completely, there will be no need for the current forms of competitive path release.

[1] http://www.caiso.com/Documents/WhitePaper-CompetitivePathAssessment.pdf

[2] Local market power mitigation enhancements http://www.caiso.com/informed/Pages/StakeholderProcesses/LocalMarketPowerMitigationEnhancements.aspx

2 Background

Local Market Power Mitigation and Reliability Requirement Determination (LMPM-RRD) under the new market requires prior designation of network constraints (or paths)[3] into two classes, "competitive" and "non-competitive." Under the LMPM-RRD procedures, generation bids that are dispatched up to relieve congestion on transmission paths pre-designated as "non-competitive" are subject to bid mitigation.[4] LMPM-RRD is applied in a two-step process to identify specific circumstances where local market power exists. This process occurs just prior to running the market (day-ahead or real-time) and applies mitigation to resources that have been identified as having local market power. All transmission facilities that are modeled in the full network model have a designation of "competitive" or "non-competitive." The first step of this process clears supply against forecast demand, with thermal limits enforced only on the set of competitive constraints (the Competitive Constraint Run or CCR). This provides a benchmark dispatch that reflects competition among suppliers since only those transmission constraints deemed competitive are applied in the network model.

The second step applies all constraints, competitive and non-competitive, and re-dispatches all resources to meet forecast load. In this second step, the All Constraint Run (ACR), some resources will be dispatched further up (compared to the CCR) to relieve congestion on the non-competitive constraints now that they have been applied in the market solution. Those resources that have been dispatched up in the ACR, relative to the competitive benchmark dispatch from the CCR, are deemed to have local market power since they were needed to relieve congestion on a non-competitive constraint. These resources will have their bid curve mitigated to their Default Energy Bid from the CCR dispatch point to the full bid-in output for that resource.

2.1 Updated network model

The network model used for the competitive path assessment study is based on the default full network model version DB57 as well as monthly release congestion revenue rights model for June 2012. The current study uses the default full network model for transmission topology and individual equipment (e.g., line and transformer) rating in PSS/E format, while using information from CRR model for aggregated constraints such as branch group rating.

The network model used in the current CPA is a bus-branch oriented network model which is derived directly from the full network model software using the exporting interface. This base PTI format bus-branch model was then imported into the simulation software for the competitive path assessment studies.

[3] The term path is used synonymously with transmission constraints in this context, and includes all transmission constraints that are enforced in Pass 1 and Pass 2 of Pre-IFM. A path is by definition directional.

[4] A detailed description of the LMPM-RRD procedures can be found in the tariff and Business Practice Manuals on the ISO web site at http://www.caiso.com/rules/Pages/default.aspx.

2.2 System conditions

2.2.1 Demand forecast

The purpose of the study is to assess the competitiveness of the candidate paths using a wide range of system supply and demand conditions. To do this, we construct three demand forecast scenarios as follows. First, actual historical load for Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric transmission areas have been obtained from telemetry data. From this data, a seasonal ISO system-wide daily peak load duration curve is created to represent the peak load condition in that season. Four pairs of seasons/years are then selected based on seasonal peak load. Three load scenarios are then chosen for each season by selecting individual days within a season that corresponds to specific points on the daily peak hour load duration curve for that season. Currently, the high, medium, and low load scenarios are chosen based on the 95^{th} percentile, 80^{th} percentile, and 65^{th} percentile, respectively, for the daily peak hour load duration curve for each season.

Table 1 shows the historical peak load for the study season since 2002. Based on the daily peak load, the season/year is selected as the representing season in the studies. Table 2 shows the three specific days selected for the high load, medium load, and low load scenarios. Table 3 shows the assumed ISO system daily peak load for various load scenarios.

Table 1. Historical seasonal peak load

YEAR	SEASON	DAILY_PEAK_LOAD
2002	Summer	42,352
2003	Summer	42,581
2011	Summer	43,247
2008	Summer	44,660
2005	Summer	45,380
2004	Summer	45,562
2009	Summer	45,762
2010	Summer	46,677
2007	Summer	48,535
2006	**Summer**	**50,198**

Table 2. Selection of typical day for seasonal load scenario

Load Scenario	Summer
High	7/26/2006
Medium	7/15/2006
Low	8/24/2006

Table 3. System daily peak load for three load scenarios (megawatts)

Load Scenario	Summer
High	47,604
Medium	42,637
Low	40,611

2.2.2 Hydroelectric generation

For purposes of determining bids for hydro units used in the analysis, three hydro scenarios (wet, medium, and dry) were simulated based on California's historical hydroelectric production data. Figure 1 shows the production level of hydroelectric resources within the ISO control area from 2002 through 2010. As shown, 2008 is a low hydroelectric production year, 2005 is a medium production year, and 2006 is a high production year.

After the low, medium and high hydro years are identified, a hydro daily production duration curve was constructed for each season and each year. The 95th percentile date was then determined in each season as the hydro scenario date for the actual 24-hour simulation. Table 4 summarizes the days identified for various load scenarios in each season.

Figure 1. Annual total ISO hydroelectric production

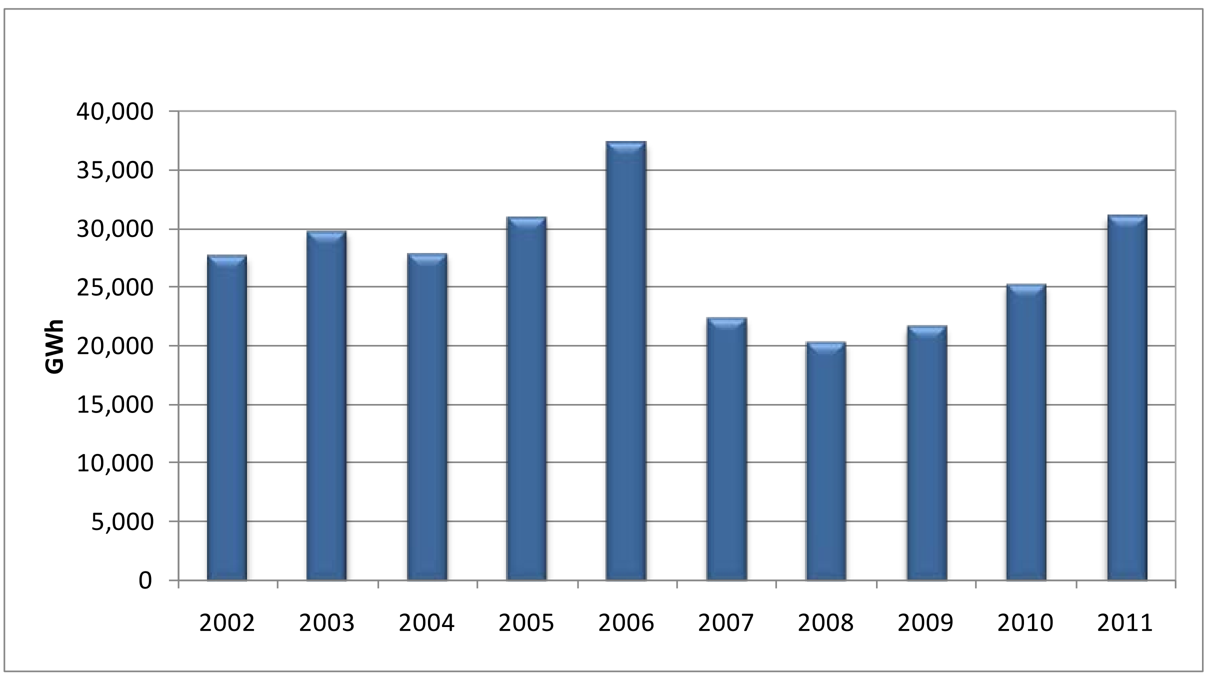

Table 4. Selection of typical day for seasonal hydro scenario

Hydro Scenario	Summer
High	7/3/2006
Medium	7/7/2005
Low	7/11/2008

2.3 Generation ownership and portfolios

Generation resources with a tolling agreement are excluded from the owners' portfolio. A new round of tolling agreement surveys has been done in December 2011 for large generation companies and load serving entities, for the survey period between January and December 2012.

This study focuses specifically on the impact of generation capacity by the ten largest owners in the ISO control area who are net sellers and have an installed generator capacity over 500 MW after consideration of tolling agreement adjustments. The CPA considers only net sellers in the selection of potentially pivotal suppliers since net buyers are less likely to benefit from increasing prices through withholding supply.

Table 5. Suppliers considered and their generation capacity concentration, adjusted for tolling agreements

Supplier	Capacity
S1	3,582
S2	3,186
S3	2,587
S4	2,246
S5	1,187
S6	1,185
S7	1,145
S8	1,119
S9	743
S10	635

2.4 Identification of candidate competitive paths

In evaluating whether or not paths are competitive, the CPA focuses on the subset of all transmission paths for which this designation is most likely to impact market outcomes. The criteria for identifying candidate competitive paths (those that will be tested in this assessment), is based on the frequency of operational mitigation that has occurred in the most recent 12 months of operation.

For the coming designations, candidate paths were identified based on data for the 12 month period from May 2011 through April 2012. This represents the most recent 12 month period for which data were available at the time this study needed to be initiated.

Hours of congestion management were based on hours when congestion occurred in the day-ahead or real-time market, as well as when congestion may have been managed in real time through reliability must-run (RMR) dispatches or exceptional dispatches.

- To identify hours when congestion occurred in the ISO's markets, every hour where a constraint's market flow equaled or exceeded its limit was counted as an hour of managed congestion for the constraint. A constraint was counted as being congested if it was binding during any part of an hour in the day-ahead LMPM run, day-ahead market run, real-time LMPM run, or the real-time market run.
- To identify hours when congestion on a constraint may have been managed in real-time using RMR resources, data were collected reflecting resources that received real-time RMR dispatch instructions. For any hour where an RMR dispatch was made to a specific resource, that hour was counted toward all lines that are mitigated using that RMR resource as identified in the ISO Operating Procedures. The line/resource relationships identified in the ISO Operating Procedures were used to create the specific mapping to count each hour of real-time RMR dispatch of a specific resource as an hour of operational mitigation for a specific line or path.
- To identify hours when congestion on a constraint may have been managed in real-time using exceptional dispatches, operator log entries were used to identify the reason for individual exceptional dispatches for real-time energy. In cases where the reason did not include a specific line or lines, but cited a specific transmission operating procedures, these transmission operating procedures were used to map the resource to a specific set of transmission facilities. As with the real-time RMR dispatches, any hour where a resource was exceptionally dispatched for real-time energy was counted as an hour of operational mitigation for all lines for which that resource was identified as providing operational mitigation unless a specific subset of those lines was identified in the operator log for that particular exceptional dispatch.

Each hour during which this analysis indicated congestion occurred either (a) in the market or that may have been managed in real-time via (b) an RMR dispatch or (c) exceptional dispatch (or any combination of the three categories) was counted as one hour of congestion for the constraint.

Table 6 shows intra-zonal interfaces and individual transmission lines that had greater than 500 hours of congestion and consequently have been identified as candidate paths.

Table 6. Candidate path list

CONSTRAINT_NAME	HOUR
33912_SPRNGGJ_115_33914_MI-WUK_115_BR_1_1	3485
34112_EXCHEQUR_115_34116_LEGRAND_115_BR_1_1	2321
31000_HUMBOLDT_115_31452_TRINITY_115_BR_1_1	2230
31461_JESSTAP_115_31464_COTWDPGE_115_BR_1_1	1585
31452_TRINITY_115_31461_JESSTAP_115_BR_1_1	1566
31566_KESWICK_60.0_31582_STLLWATR_60.0_BR_1_1	1529
31580_CASCADE_60.0_31582_STLLWATR_60.0_BR_1_1	1501
31450_WILDWOOD_115_31464_COTWDPGE_115_BR_1_1	1427
31450_WILDWOOD_115_31011_FRSTGLEN_115_BR_1_1	1427
31011_FRSTGLEN_115_31010_LOWGAP1_115_BR_1_1	1427
31010_LOWGAP1_115_31015_BRDGVLLE_115_BR_1_1	1427
31555_MSSTAP2_60.0_31553_BIGBAR_60.0_BR_1_1	1266
31556_TRINITY_60.0_31555_MSSTAP2_60.0_BR_1_1	1266
31093_HYMPOMJT_60.0_31553_BIGBAR_60.0_BR_1_1	1264
31092_MPLECRK_60.0_31093_HYMPOMJT_60.0_BR_1_1	1264
31555_MSSTAP2_60.0_31557_MILSTSTA_60.0_BR_1_1	1258
31118_KEKAWAKA_60.0_31308_LYTNVLLE_60.0_BR_1_1	1258
31116_GRBRVLLE_60.0_31118_KEKAWAKA_60.0_BR_1_1	1258
31080_HUMBOLDT_60.0_31092_MPLECRK_60.0_BR_1_1	1214
HUMBOLDT_BG	1042
STHMAGUNDEN_BG	950
30900_GATES_230_30970_MIDWAY_230_BR_1_1	889
31110_BRDGVLLE_60.0_31015_BRDGVLLE_115_XF_1	855
SCE_PCT_IMP_BG	800
34101_CERTANJ2_115_34116_LEGRAND_115_BR_1_1	776
31110_BRDGVLLE_60.0_31112_FRUITLND_60.0_BR_1_1	732
31112_FRUITLND_60.0_31114_FRTSWRD_60.0_BR_1_1	732
31114_FRTSWRD_60.0_31116_GRBRVLLE_60.0_BR_1_1	730
31080_HUMBOLDT_60.0_31088_HMBLTJT_60.0_BR_1_1	712
31306_WILLITS_60.0_31308_LYTNVLLE_60.0_BR_1_1	706
31088_HMBLTJT_60.0_31090_HMBLTBY_60.0_BR_1_1	702
31088_HMBLTJT_60.0_31084_HARRISST_60.0_BR_1_1	702
32218_DRUM_115_32244_BRNSWKT2_115_BR_2_1	684
30515_WARNERVL_230_30800_WILSON_230_BR_1_1	680
30790_PANOCHE_230_30873_HELM_230_BR_1_1	670
30875_MCCALL_230_30880_HENTAP2_230_BR_1_1	662
30881_HENRIETA_230_34430_HENRETTA_115_XF_3	657
34105_CERTANJ1_115_34121_SHARONT_115_BR_1_1	654
34100_CHWCHLLA_115_34101_CERTANJ2_115_BR_1_1	650
30810_GREGG_230_30879_HENTAP1_230_BR_1_1	650
30835_HERNDON_230_34412_HERNDON_115_XF_2_P	650
30805_BORDEN_230_30810_GREGG_230_BR_1_1	650
30875_MCCALL_230_34370_MCCALL_115_XF_3_P	650
34160_HAMMONDS_115_34161_DFSTP_115_BR_1_1	650
30835_HERNDON_230_34412_HERNDON_115_XF_1_P	650
34161_DFSTP_115_34162_OROLOMA_115_BR_1_1	650
30875_MCCALL_230_34370_MCCALL_115_XF_1_P	650
34159_PANOCHEJ_115_34160_HAMMONDS_115_BR_1_1	650
34158_PANOCHE_115_30790_PANOCHE_230_XF_1	650
34157_PANOCHET_115_34156_MENDOTA_115_BR_1_1	650

CONSTRAINT_NAME	HOUR
34116_LEGRAND_115_34154_DAIRYLND_115_BR_1_1	650
34116_LEGRAND_115_34154_DAIRYLND_115_BR_1A_1	650
30873_HELM_230_30875_MCCALL_230_BR_1_1	650
30835_HERNDON_230_34412_HERNDON_115_XF_2_T	649
34105_CERTANJ1_115_34100_CHWCHLLA_115_BR_1_1	649
30835_HERNDON_230_34412_HERNDON_115_XF_2_S	649
30880_HENTAP2_230_30881_HENRIETA_230_BR_2_1	649
30879_HENTAP1_230_30881_HENRIETA_230_BR_1_1	649
30835_HERNDON_230_34412_HERNDON_115_XF_1_T	649
30875_MCCALL_230_34370_MCCALL_115_XF_3_T	649
30796_STOREY1_230_30810_GREGG_230_BR_1_1	649
30875_MCCALL_230_34370_MCCALL_115_XF_3_S	649
30835_HERNDON_230_34412_HERNDON_115_XF_1_S	649
34540_HENRITTA_70.0_34542_JCBSCRNR_70.0_BR_1_1	649
34462_GUR3TPT_70.0_34554_AMSTGSW_70.0_BR_1_1	649
34460_GUERNSEY_70.0_34462_GUR3TPT_70.0_BR_1_1	649
34418_KINGSBRG_115_34420_CORCORAN_115_BR_2_1	649
34418_KINGSBRG_115_34420_CORCORAN_115_BR_1_1	649
34363_CLOVISJ1_115_34360_WWARDJT_115_BR_1_1	649
30875_MCCALL_230_34370_MCCALL_115_XF_1_T	649
34362_CLOVIS_115_34363_CLOVISJ1_115_BR_1_1	649
34360_WWARDJT_115_34414_WOODWARD_115_BR_1_1	649
34358_KERCKHF2_115_34360_WWARDJT_115_BR_1_1	649
34358_KERCKHF2_115_34123_KERCH1TP_115_BR_2_1	649
30875_MCCALL_230_34370_MCCALL_115_XF_1_S	649
34356_KERCKHF1_115_34123_KERCH1TP_115_BR_1_1	649
34363_CLOVISJ1_115_34366_SANGER_115_BR_1_1	649
30830_KEARNEY_230_30835_HERNDON_230_BR_1_1	649
34159_PANOCHEJ_115_34158_PANOCHE_115_BR_1_1	649
30875_MCCALL_230_34370_MCCALL_115_XF_2	649
34462_GUR3TPT_70.0_34542_JCBSCRNR_70.0_BR_1_1	649
34157_PANOCHET_115_34158_PANOCHE_115_BR_1_1	649
30796_STOREY1_230_30800_WILSON_230_BR_1_1	649
34128_OAKH_JCT_115_34123_KERCH1TP_115_BR_2_1	649
30790_PANOCHE_230_30825_MCMULLN1_230_BR_1_1	649
30825_MCMULLN1_230_30830_KEARNEY_230_BR_1_1	649
34116_LEGRAND_115_34134_WILSONAB_115_BR_1_1	649
31086_EUREKA_60.0_31090_HMBLTBY_60.0_BR_1_1	645
SLIC1883001_SDGE_OC_NG	641
HUMBOLDT_IMP_NG	632
31080_HUMBOLDT_60.0_31090_HMBLTBY_60.0_BR_2_1	627
31000_HUMBOLDT_115_31015_BRDGVLLE_115_BR_1_1	583
HUMBSB_BK_BG	581
TMS_DLO_NG	575
33200_LARKIN_115_33204_POTRERO_115_BR_2_1	509
T-133METCALF_NG	508
31080_HUMBOLDT_60.0_31000_HUMBOLDT_115_XF_2	508

3 Competitive path assessment

As described above, the CPA is based on typical days in the season being examined. For each typical day, various potentially pivotal supplier combinations are evaluated for each of the nine load and hydro scenarios. The following section presents the hourly system conditions for the base case, medium load, and medium hydro scenario in the study season without any suppliers' capacity removed.

3.1 2012 release 2 results

3.1.1 Base case results

The base case results are presented in Table 7 below for medium load, medium hydro, and no supplier capacity withdrawn. General simulation characteristics are presented, including load, total generation internal to the ISO, net import values, and internal path flows (Path 15 and Path 26) for each of the 24 hours of the medium load medium hydro base case.

3.1.2 CPA results

All but five candidate paths pass under the study conditions, and are therefore deemed competitive for the study season.

Table 7. Model output for base case: medium hydro, medium load, and no supply withdrawn

	Load (MWh)		Generation (MWh)		Net Import (MWh)		Internal Path Flow (N->S)	
Hour	NP26	SP26	NP26	SP26	NP26	SP26	Path 15	Path 26
1	11,956	15,587	11,877	8,904	2,643	4,015	2,671	2,022
2	11,386	14,633	13,705	7,974	1,620	2,618	1,817	2,743
3	11,354	13,939	13,641	7,446	1,462	2,633	577	2,918
4	11,139	13,602	13,706	7,165	1,310	2,449	86	3,070
5	11,121	13,543	13,678	7,275	1,269	2,331	13	2,980
6	11,244	13,547	13,171	7,367	1,590	2,551	176	2,960
7	11,636	14,119	13,302	7,702	2,402	2,461	402	3,118
8	12,090	15,648	14,091	8,663	2,479	2,624	742	3,308
9	12,726	17,564	14,405	10,284	2,502	3,200	284	3,023
10	13,639	19,569	15,336	12,062	2,416	3,480	-237	2,547
11	14,340	21,178	16,186	13,686	2,420	3,684	-232	2,856
12	14,901	22,267	17,214	14,779	2,209	3,577	-360	2,717
13	15,432	23,282	17,779	15,790	2,442	3,200	-235	2,743
14	16,067	24,196	18,710	16,704	2,268	3,318	-122	2,880
15	16,591	25,014	19,190	17,517	2,399	3,234	90	3,027
16	17,053	25,450	19,580	17,934	2,579	3,353	551	3,147
17	17,259	25,378	19,678	17,829	2,696	3,387	69	2,918
18	17,230	24,912	19,744	17,299	2,802	3,354	565	3,299
19	16,821	23,850	19,337	16,361	2,726	3,296	732	3,263
20	16,175	22,812	18,336	15,609	3,073	3,014	763	3,454
21	16,145	22,752	17,892	15,273	3,188	3,249	561	3,308
22	15,315	21,382	17,085	13,699	2,989	3,604	265	2,999
23	13,875	19,323	14,655	11,641	2,821	4,372	193	2,976
24	12,560	17,391	13,620	9,987	2,562	3,729	541	3,329

Table 8. Failed candidate path list

CONSTRAINT NAME
SCE_PCT_IMP_BG
34101_CERTANJ2_115_34116_LEGRAND_115_BR_1_1
31114_FRTSWRD_60.0_31116_GRBRVLLE_60.0_BR_1_1
32218_DRUM_115_32244_BRNSWKT2_115_BR_2_1
SLIC1883001_SDGE_OC_NG

Table 9. Competitive path list

CONSTRAINT_NAME	CONSTRAINT_NAME
33912_SPRNGGJ_115_33914_MI-WUK_115_BR_1_1	34116_LEGRAND_115_34154_DAIRYLND_115_BR_1_1
34112_EXCHEQUR_115_34116_LEGRAND_115_BR_1_1	34116_LEGRAND_115_34154_DAIRYLND_115_BR_1A_1
31000_HUMBOLDT_115_31452_TRINITY_115_BR_1_1	30873_HELM_230_30875_MCCALL_230_BR_1_1
31461_JESSTAP_115_31464_COTWDPGE_115_BR_1_1	30835_HERNDON_230_34412_HERNDON_115_XF_2_T
31452_TRINITY_115_31461_JESSTAP_115_BR_1_1	34105_CERTANJ1_115_34100_CHWCHLLA_115_BR_1_1
31566_KESWICK_60.0_31582_STLLWATR_60.0_BR_1_1	30835_HERNDON_230_34412_HERNDON_115_XF_2_S
31580_CASCADE_60.0_31582_STLLWATR_60.0_BR_1_1	30880_HENTAP2_230_30881_HENRIETA_230_BR_2_1
31450_WILDWOOD_115_31464_COTWDPGE_115_BR_1_1	30879_HENTAP1_230_30881_HENRIETA_230_BR_1_1
31450_WILDWOOD_115_31011_FRSTGLEN_115_BR_1_1	30835_HERNDON_230_34412_HERNDON_115_XF_1_T
31011_FRSTGLEN_115_31010_LOWGAP1_115_BR_1_1	30875_MCCALL_230_34370_MCCALL_115_XF_3_T
31010_LOWGAP1_115_31015_BRDGVLLE_115_BR_1_1	30796_STOREY1_230_30810_GREGG_230_BR_1_1
31555_MSSTAP2_60.0_31553_BIGBAR_60.0_BR_1_1	30875_MCCALL_230_34370_MCCALL_115_XF_3_S
31556_TRINITY_60.0_31555_MSSTAP2_60.0_BR_1_1	30835_HERNDON_230_34412_HERNDON_115_XF_1_S
31093_HYMPOMJT_60.0_31553_BIGBAR_60.0_BR_1_1	34540_HENRITTA_70.0_34542_JCBSCRNR_70.0_BR_1_1
31092_MPLECRK_60.0_31093_HYMPOMJT_60.0_BR_1_1	34462_GUR3TPT_70.0_34554_AMSTGSW_70.0_BR_1_1
31555_MSSTAP2_60.0_31557_MILSTSTA_60.0_BR_1_1	34460_GUERNSEY_70.0_34462_GUR3TPT_70.0_BR_1_1
31118_KEKAWAKA_60.0_31308_LYTNVLLE_60.0_BR_1_1	34418_KINGSBRG_115_34420_CORCORAN_115_BR_2_1
31116_GRBRVLLE_60.0_31118_KEKAWAKA_60.0_BR_1_1	34418_KINGSBRG_115_34420_CORCORAN_115_BR_1_1
31080_HUMBOLDT_60.0_31092_MPLECRK_60.0_BR_1_1	34363_CLOVISJ1_115_34360_WWARDJT_115_BR_1_1
HUMBOLDT_BG	30875_MCCALL_230_34370_MCCALL_115_XF_1_T
STHMAGUNDEN_BG	34362_CLOVIS_115_34363_CLOVISJ1_115_BR_1_1
30900_GATES_230_30970_MIDWAY_230_BR_1_1	34360_WWARDJT_115_34414_WOODWARD_115_BR_1_1
31110_BRDGVLLE_60.0_31015_BRDGVLLE_115_XF_1	34358_KERCKHF2_115_34360_WWARDJT_115_BR_1_1
31110_BRDGVLLE_60.0_31112_FRUITLND_60.0_BR_1_1	34358_KERCKHF2_115_34123_KERCH1TP_115_BR_2_1
31112_FRUITLND_60.0_31114_FRTSWRD_60.0_BR_1_1	30875_MCCALL_230_34370_MCCALL_115_XF_1_S
31080_HUMBOLDT_60.0_31088_HMBLTJT_60.0_BR_1_1	34356_KERCKHF1_115_34123_KERCH1TP_115_BR_1_1
31306_WILLITS_60.0_31308_LYTNVLLE_60.0_BR_1_1	34363_CLOVISJ1_115_34366_SANGER_115_BR_1_1
31088_HMBLTJT_60.0_31090_HMBLTBY_60.0_BR_1_1	30830_KEARNEY_230_30835_HERNDON_230_BR_1_1
31088_HMBLTJT_60.0_31084_HARRISST_60.0_BR_1_1	34159_PANOCHEJ_115_34158_PANOCHE_115_BR_1_1
30515_WARNERVL_230_30800_WILSON_230_BR_1_1	30875_MCCALL_230_34370_MCCALL_115_XF_2
30790_PANOCHE_230_30873_HELM_230_BR_1_1	34462_GUR3TPT_70.0_34542_JCBSCRNR_70.0_BR_1_1
30875_MCCALL_230_30880_HENTAP2_230_BR_1_1	34157_PANOCHET_115_34158_PANOCHE_115_BR_1_1
30881_HENRIETA_230_34430_HENRETTA_115_XF_3	30796_STOREY1_230_30800_WILSON_230_BR_1_1
34105_CERTANJ1_115_34121_SHARONT_115_BR_1_1	34128_OAKH_JCT_115_34123_KERCH1TP_115_BR_2_1
34100_CHWCHLLA_115_34101_CERTANJ2_115_BR_1_1	30790_PANOCHE_230_30825_MCMULLN1_230_BR_1_1
30810_GREGG_230_30879_HENTAP1_230_BR_1_1	30825_MCMULLN1_230_30830_KEARNEY_230_BR_1_1
30835_HERNDON_230_34412_HERNDON_115_XF_2_P	34116_LEGRAND_115_34134_WILSONAB_115_BR_1_1
30805_BORDEN_230_30810_GREGG_230_BR_1_1	31086_EUREKA_60.0_31090_HMBLTBY_60.0_BR_1_1
30875_MCCALL_230_34370_MCCALL_115_XF_3_P	HUMBOLDT_IMP_NG
34160_HAMMONDS_115_34161_DFSTP_115_BR_1_1	31080_HUMBOLDT_60.0_31090_HMBLTBY_60.0_BR_2_1
30835_HERNDON_230_34412_HERNDON_115_XF_1_P	31000_HUMBOLDT_115_31015_BRDGVLLE_115_BR_1_1
34161_DFSTP_115_34162_OROLOMA_115_BR_1_1	HUMBSB_BK_BG
30875_MCCALL_230_34370_MCCALL_115_XF_1_P	TMS_DLO_NG
34159_PANOCHEJ_115_34160_HAMMONDS_115_BR_1_1	33200_LARKIN_115_33204_POTRERO_115_BR_2_1
34158_PANOCHE_115_30790_PANOCHE_230_XF_1	T-133METCALF_NG
34157_PANOCHET_115_34156_MENDOTA_115_BR_1_1	31080_HUMBOLDT_60.0_31000_HUMBOLDT_115_XF_2

4 Concluding comments

The simulation results and competitive test outcomes presented in this paper represent the competitive path designations that will be incorporated in the market software for the upcoming season. These designations reflect updates introduced in the last version of the CPA, updated input data and network model, as well as adjustments to supplier portfolios to account for transfer of operational and bidding control of generation resources within the ISO control area.

Incorporating results from the season studied, all but five candidate paths passed the competitiveness test. Note that there are a total of roughly 4,800 individual line segments in the Full Network Model and several aggregated constraints, and a subset of these constraints were included in the testing as candidate paths.

There are still factors that may require periodic review and update of the CPA. Such factors include:

- **Update of full network model.** The FNM is updated periodically to reflect new transmission facilities, adjustments of major transmission limits, seasonal switching, and other factors. Temporary network changes such as outages may have a significant impact on market congestion.

- **Market clearing model and optimization**. Currently the CPA is done by a simulation tool different from the market software. To further align the simulations used for path designations with the actual market model and software, developing the CPA within a simulation tool that more closely reflects the market software will be reviewed.

- **Impact of relatively small generation owners.** The 3-pivotal supplier tests are computationally intensive, and there are an extremely large number of potential combinations of suppliers that could withdraw. It is impractical to simulate all potential combinations for all suppliers. The reason for the threshold of 500 MW is to identify larger suppliers that can more easily influence market prices. However, there may be cases where, in a relatively small congested area, a small generation owner whose generation capacity is less than the selection threshold may be pivotal to relieve the constraint. While this analysis does not consider such cases, the Department of Market Monitoring has developed tools to analyze the effectiveness of LMPM in local areas and will monitor market outcomes for the purpose of detecting potentially uncompetitive circumstances in local areas. In cases where uncompetitive outcomes are observed and the competitive path designations for that area do not appear to be consistent with the market outcomes, DMM will evaluate both the path designations as well as the application of LMPM in that area.