



California ISO
Shaping a Renewed Future

Mitigation for Exceptional Dispatch in LMPM Enhancements Phase 2

Revised Draft Final Proposal

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1 Introduction

Implementation of the second phase of the LMPM Enhancements market initiative will introduce a dynamic assessment of local market power and end the static approach that has historically been utilized to determine non-competitive constraints. While the new dynamic assessment will greatly improve the accuracy of local market power mitigation within the market dispatch, it does introduce a gap for determining non-competitive constraints in connection with Exceptional Dispatches. This proposal addresses that gap by creating a separate set of path designations that are based on the dynamic designations and will be used to determine when an Exceptional Dispatch should be mitigated. The proposal also extends the methodology to providing a set of default path designations that will be used as “back-up” in the event that the dynamic competitive path assessment within the market software fails to produce a valid set of path designations.

The paper is organized as follows. The issue of Exceptional Dispatch mitigation and path competitive/non- competitive designation is described, and then stakeholder comments are listed. A few general alternative methods are discussed, and in particular, statistical tests are demonstrated. Finally the proposal is given, which remains the same as the previous one, followed by the impact studies.

2 Process and Time Table

Item	Date
Post Issue Paper and Straw Proposal	July 20, 2012
Stakeholder Conference Call	July 27, 2012
Stakeholder Comments Due	August 3, 2012
Post Draft Final Proposal	September 7, 2012
Stakeholder Conference Call	September 11, 2012
Stakeholder Comments Due	September 18, 2012
Post Revised Draft Final Proposal	October 30, 2012
Stakeholder Conference Call	November 6, 2012
Stakeholder Comments Due	November 14, 2012
Board Meeting	December 13-14, 2012

3 Exceptional Dispatch Mitigation Issue under Dynamic Competitive Path Assessment

Under existing rules, Exceptional Dispatch are subject to mitigation under four circumstances where the Exceptional Dispatch was made to

1. Address reliability requirements related to non-competitive transmission constraints,
2. Access stranded Ancillary Services Awards or RUC Availability, and

3. To manage specific resources whose water source comes from the Sacramento Delta (“delta dispatch”).
4. Move a resource to its minimum dispatchable operating level to make available the higher ramp rates for that resource.

When an exceptional dispatch is made for any of these four reasons, the price applied to the calculated Exceptional Dispatch Energy (EDE) is mitigated to the better of the resource’s Default Energy Bid or the Locational Marginal Price (LMP).¹

The existing approach is as follows. Cases where the Exceptional Dispatch was made to manage a non-competitive transmission constraint are identified by associating the transmission constraint indicated by the ISO dispatcher in the Exceptional Dispatch log with the corresponding constraint on the list of competitive constraints that is produced four times each year by the Department of Market Monitoring using the static competitive path assessment methodology.

As described above, the existing approach for determining when to apply mitigation to Exceptional Dispatch that were made to manage a non-competitive constraint relies on the existence of a list of competitive constraints. If a constraint is not on the list of competitive constraints, it is non-competitive. Currently a static list exists that is the outcome of a competitive path assessment performed four times each year by the Department of Market Monitoring. When LMPM Enhancements Phase 2 is implemented in the Spring of 2013 the real time market will have a dynamic competitive path assessment performed in-line with the execution of the market software and the static list will no longer be produced. This creates a gap in identifying circumstances where Exceptional Dispatches are made to manage non-competitive constraints and appropriately applying local market power mitigation.

Most Exceptional Dispatch are preemptive – made in anticipation of certain circumstances based on observed system and market conditions that cannot be managed by the market software as opposed to reacting to an event or circumstance that has already happened. Preemptive Exceptional Dispatch made to manage transmission constraints may have the effect of relieving the anticipated congestion such that it does not materialize in the market. In this case, since the congestion was preempted by the Exceptional Dispatch there will be no dynamic competitive path assessment performed for that constraint. This introduces a potentially material under-identification of local market power since the Exceptional Dispatch was made under circumstances that presumed congestion and was limited by the set of resources that were effective in relieving the presumed congestion. These circumstances may have been non-competitive and created local market power that could not be detected by the dynamic competitive path assessment since the Exceptional Dispatch relieved the congestion in the market and precluded assessment and application of mitigation.

A separate set of path designations is required to determine whether an Exceptional Dispatch is for the purpose of managing non-competitive constraints. This is only an issue with Exceptional Dispatches issued to manage transmission constraints in real time.

The dynamic competitive path assessment that identifies local market power within the execution of the market software presumes a constraint is competitive unless it fails the competitiveness test. In this case, the presumption of competitive unless proven otherwise is predicated on the availability of a positive test for competitiveness. In the case described above where the Exceptional Dispatch relieved the congestion that would have prompted the test, there is no positive test to rely on to identify non-competitive circumstances. The default of

¹ If the clean bid is less than the default bid, the settlement is the greater of the clean bid or the LMP.

competitive is not valid unless there is a positive test to determine otherwise. The proposed methodology accounts for this gap.

4 Stakeholder Comments and Feedback

There are two stakeholder calls to discuss this market initiative in July and September. A few typical comments are related to:

- The existence and mitigation of exceptional dispatch itself
- Alternative method to deem competitiveness for Exceptional Dispatch related transmission facilities
- The reason for thresholds (10 hours and 75%) in the proposed test

The current market initiative tries to address the problem of Exceptional Dispatch mitigation when dynamic competitive path assessment is implemented in real-time market. The general circumstance or assumption is that the exceptional dispatch may still exist, and some of them will be mitigated, as described in ISO tariff. Although some stakeholders expressed opinions on the use of exceptional dispatch itself, this is not really the subject of this market initiative. The purpose of this market initiative is to address the lack of competitive designation for the exceptional dispatch mitigation, and the proposal is consistent with the current existing practice. Although the focus of this market initiative is not to address the general Exceptional Dispatch topic, it does provide some information on the different categories of Exceptional Dispatch and the corresponding mitigation impact.

The alternative methods to deem competitiveness and justification for the fixed threshold are directly related to this market initiative. Below there are two sections addressing them, one discussing alternative methods and their difficulties, the other using statistical test to support the thresholds.

5 Discussion of Alternative Solutions

The center topic of the market initiative is how to designate transmission competitiveness for exceptional dispatch, given that the market may not be able to give the designation in the dynamic competitive path assessment. There are a few general options:

- Designation from off-line study
- Default static designation (either competitive or non-competitive by default)
- Designation from historical data

Designation from off-line study

One alternative suggested by stakeholders is to perform an off-line study of each specific reason an exceptional dispatch is made in real time. This could be performed periodically once a specific reason was used frequently or each time an exceptional dispatch was made for a transmission related reason. In order to perform an off-line study of the competitiveness of transmission related Exceptional Dispatch reasons, the ISO would need to be able to accurately quantify both available effective supply, demand for the product that the Exceptional Dispatch is producing, where the later may require re-simulation to create congested conditions that were anticipated when the Exceptional Dispatch was issued. A clear statement or quantification of demand is not always available, and because there is an element of Operator discretion in

determining the need for and issuing Exceptional Dispatch, there are many cases where the perceived demand is not obtainable after the fact. Furthermore, even in instances where the supply and demand are well defined and quantifiable, performing a competitiveness test requires extensive effort. This has been the case with the “static” competitive path assessment, and performing more tests on less well defined constraints / products is not practical on an ad hoc basis.

Default static designation (either competitive or non-competitive by default)

The second option is to deem Exceptional Dispatch related transmission facilities either always competitive or always non-competitive with no little or no reevaluation. This is a very crude designation, and is less consistent with the more dynamic approach originally proposed in this initiative. Blanket static designations (all are always uncompetitive / competitive) not only fail to recognize changes in market and market model conditions, but also can be overly mitigative (in the case of always non-competitive) or inappropriately allow for the exercise of local market power (in the case of always competitive).

Designation from historical data

The third option, which is relied on by the current proposal, is to derive competitiveness/non-competitiveness designation based on historical data. Although market and operating conditions may not be exactly the same at two different times, there may be intrinsic information shared by a few recent cases. For example, spring operating conditions may be different from other seasons. If a constraint tends to be binding in spring, competitiveness evaluation from recent days may still be valid, since it reflects the general spring operating conditions. Other advantages of historical data designation are that it is systematic and relatively simple. Therefore, the proposal adopts it as the basis for the Exceptional Dispatch transmission designation.

6 Applying a Statistical Test for Competitiveness

Stakeholders provided comments indicating the ISO did not provide adequate support for the proposed rules for establishing whether an Exceptional Dispatch was made under competitive conditions. One of the several aspects encompassed by these comments is the use of two thresholds for competitive classification: (1) at least 10 hours of observed congestion in the prior 60 days, and (2) observed historical competitive rate over the prior 60 days is greater than 75 percent. As discussed elsewhere in this paper, the approach and threshold values were chosen to be consistent with the target of this design element: to provide a designation where we are reasonably confident that the transmission constraint is predominantly competitive.

To apply a statistical hypothesis test to this problem, we set up a null hypothesis (H_0) and an alternate hypothesis (H_a) to which we apply the statistical test:

H_0 : $x \leq x^*$ (observed competitive hours x is not greater than the threshold value x^*)

H_a : $x > x^*$ (observed competitive hours x is greater than the threshold value x^*)

The test will either fail to reject the null hypothesis, in which case we accept that the constraint is not competitive, or reject the null hypothesis and accept the alternate hypothesis that the observed historical competitive rate exceeds the threshold and the constraint is deemed competitive.

Specification of the statistical test requires knowing the distribution and related parameters of the test variable, a threshold value, and a confidence level at which the test is evaluated. The test variable is the series of observed historical competitive designations which are binary (competitive, non-competitive) and follow a binomial distribution with sample size n , observed number of successes (competitive designations) x , and observed success rate or probability of success equal to x / n .

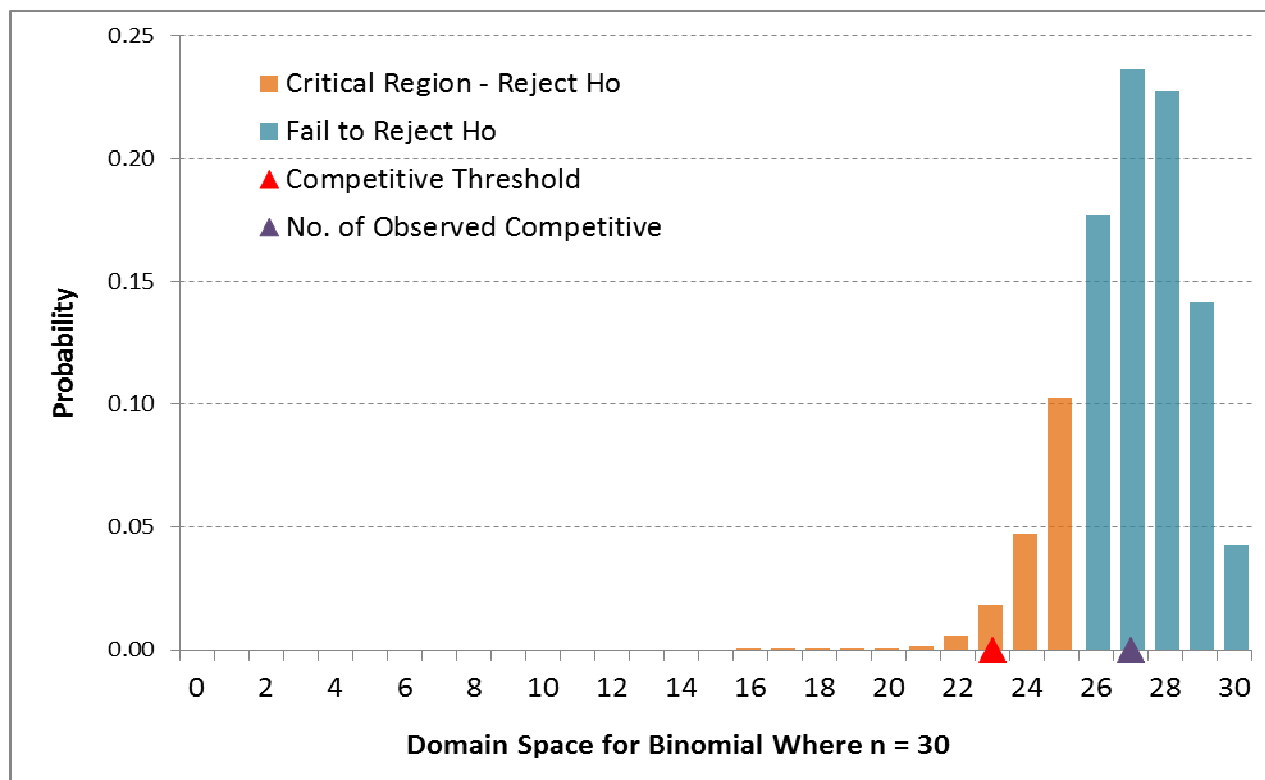
The threshold value x^* represents the number of successes that defines “predominantly competitive”. Instead of explicitly stating x^* , we express the test threshold as a proportion p^* and apply the sample size n to derive the threshold number of success x^* . We have chosen 75 percent, or $p^* = 0.75$, as the threshold that identifies predominantly competitive. For a sample where $n = 30$, the resulting x^* is 23 ($p^* \times n = 0.75 \times 30 = 22.5$ and round up to next whole number).

The confidence level at which we apply the test, cl , is 0.75. The confidence level takes into account the variance of the distribution of the observed historical competitiveness. Used in this statistical test, the confidence level defines the minimum amount of the distribution that must lie above the test threshold x^* in order for us to reject the null hypothesis that the constraint is non-competitive and accept the alternate hypothesis that the constraint is competitive. The value 0.75 is chosen to correspond to the “reasonably confident” portion of the statement about determining that a constraint for which an Exceptional Dispatch is made is competitive. Higher degrees of confidence (generally from 0.90 to 0.99) are most often applied in statistical hypothesis testing. A higher confidence level in this test reduces the likelihood that the historical data will conclude the constraint is competitive. We have used a lower confidence level here in recognition of the conservative three pivotal supplier test that underlies the historical data on which this statistical test is based.

Figure 1 shows an example of this statistical test for the parameters described above. The binomial distribution is depicted with the bars for sample size of 30 hours, 27 of which were competitive (by way of the Dynamic Competitive Path Assessment). The purple triangle indicates the observed number of competitive hours (27), and the red triangle indicates the threshold number of observed competitive hours (23). The distribution is segmented by color to indicate the confidence level of 0.75. The blue bars indicate the upper 75 percent of the distribution and the orange bars indicate the lower 25 percent of the distribution.

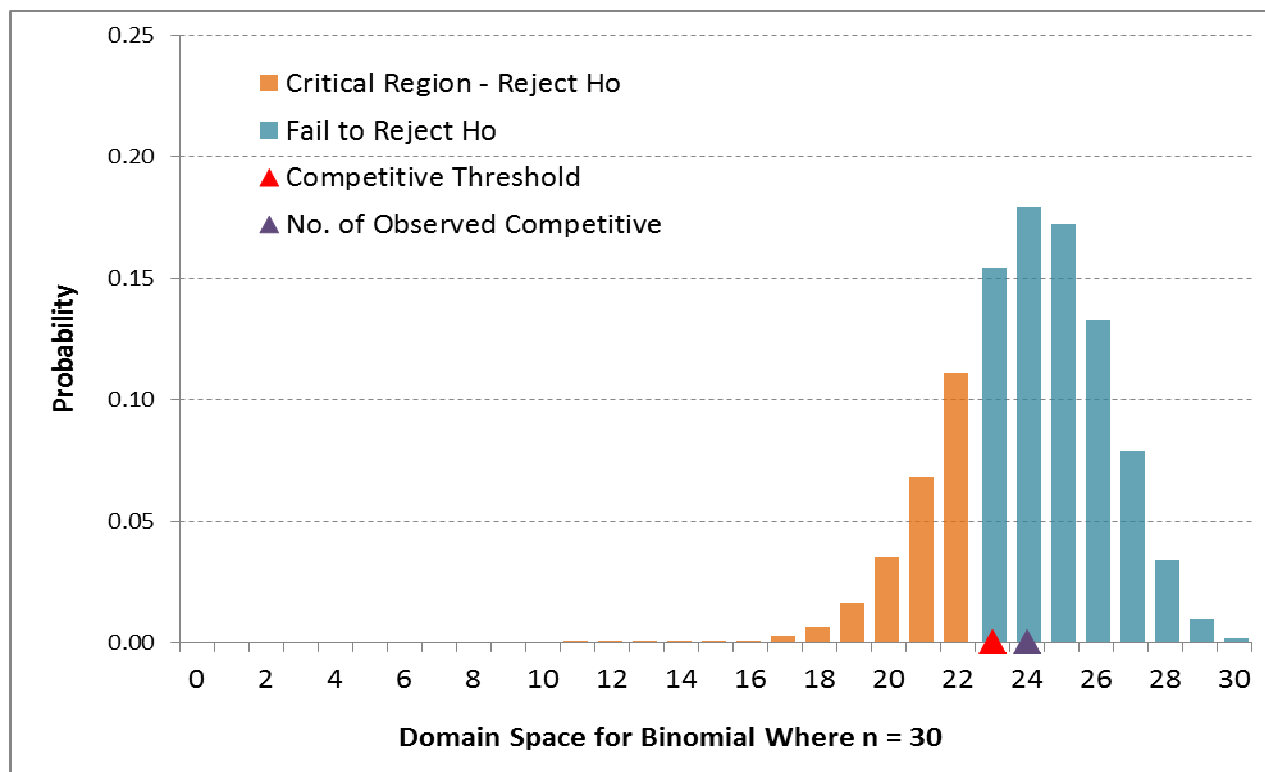
In this case, the test threshold is in the “critical region” (lower 25 percent of the distribution) which means that more than 75 percent of the distribution (our confidence level) lies above the test threshold. We reject the null hypothesis that the constraint is non-competitive and accept the alternate hypothesis that the constraint is competitive.

Figure 1: Distribution and hypothesis test for case where 27 of 30 observed hours of congestion were competitive



A different scenario is depicted in Figure 2, which shows the same test conditions except the observed number of competitive hours is 24 (or 80 percent). Note that the observed number of competitive hours is (slightly) greater than the test threshold number of hours (purple triangle is to the right of the red triangle). However, the test threshold is not in the “critical region”, so less than 75 percent of the distribution lies above the test threshold. Therefore, we cannot conclude with a confidence level of 0.75 that the number of observed competitive hours indicates the constraint is competitive (i.e. we cannot reject the null hypothesis that the constraint is non-competitive).

Figure 2: Distribution and hypothesis test for case where 24 of 30 observed hours of congestion were competitive



We can use this hypothesis test for different sample sizes (number of hours of observed congestion) to derive a competitive frontier. This frontier will describe the minimum number of observed competitive hours required to conclude with 75 percent confidence that the constraint is predominantly competitive for any sample size. The resulting competitive frontier has two important properties. First, the proportion of observed competitive hours is significantly above 75 percent with small sample size and decreases to converge with 75 percent as the sample size increases. Second, the test is less accurate and reliable for very small sample size.

The competitive threshold derived from applying this hypothesis test to different observed hours of congestion (sample size) is consistent with the original proposal where a minimum number of congested hours and minimum observed competitive rate among those hours is required to be reasonably confident that the constraint for which the Exceptional Dispatch was made was predominantly competitive. The original proposal is, therefore, a simplified application of the competitive designation rules prescribed by the more formal statistical hypothesis test described in this section. For this reason, the current proposal recognizes this relationship and maintains the original simple representation of the thresholds for competitive designation for mitigation of Exceptional Dispatch, which are described again in more detail below.

7 Proposal for Triggering Mitigation of Exceptional Dispatch for Non-competitive Constraints

The ISO proposes to use historical designations produced by the dynamic competitive path assessment that is executed in the RTUC market runs to create a set of path designations that

are used in applying mitigation to Exceptional Dispatch. The proposed methodology applies a threshold to both the frequency of observed congestion as well as the frequency with which the constraint is deemed competitive by the dynamic competitive path assessment. As discussed above, the underlying premise that supports a competitive default designation does not hold in the cases where the path has not been sufficiently tested. In cases where there is insufficient testing (the frequency with which the path has been binding and tested does not meet the threshold) the path will be deemed non-competitive for purposes of applying mitigation to Exceptional Dispatch.

The proposed methodology for determining path designations for purposes of applying mitigation to Exceptional Dispatch is

- A constraint that passes the following two thresholds will be deemed competitive for purposes of applying mitigation to Exceptional Dispatch:
 - Congestion Threshold: Congested in 10 hours or more in the RTUC run where the dynamic competitive path assessment is calculated, and
 - Competitive Threshold: Deemed competitive 75 percent or more of the instances where the constraint was binding and tested.
- Data for the test statistics will reflect the most recent 60 days of trade dates available at the time of testing to focus application on more seasonal conditions.
- This set of designations will be updated not less frequently than every seven days to reflect changes in system and market conditions.

The purpose of the Congestion Threshold is to ensure there are sufficient instances where the constraint has been tested in the past 60 days such that the Competitive Threshold is a more robust statistic. The purpose of the Competitive Threshold is to strike a balance between the two non-observable conditions at the time of the Exceptional Dispatch. The proposed 75 percent threshold is intended to provide allowance for some historical observations of non-competitive conditions but still ensure that the constraint has been predominantly competitive before excusing associated Exceptional Dispatch from the application of local market power mitigation.

As described above, since there may be no positive test of competitiveness in a particular interval we substitute a statistic based on historical tests (via the dynamic assessment) as a proxy for determining whether or not the constraint for which the Exceptional Dispatch was made was competitive or non-competitive at the time the dispatch was made.

An exception to the above criteria will apply to Path 15 and Path 26. These two paths will be considered competitive unless the constraint was congested in 10 or more hours in the test period and was deemed competitive less than 75 percent of the time. This exception allows these major inter-zonal interfaces to remain competitive even when they have not been binding in the past 60 days. If they have been binding 10 or more hours and test competitive less than 75 percent of the time then the designation used for applying mitigation to Exceptional Dispatch will be non-competitive.

8 Default Designations for Use if LMPM Process Fails

There is an additional process that requires path designations in the event they are not available from the market. Competitive path designations are required in the event of a failure of the dynamic competitive path assessment in the market software. In this instance, the next step in the mitigation process, the mitigation trigger (LMP Decomposition), may still be able to run if provided a set of path designations that can be used in the decomposition of the LMP and

evaluation of need for mitigation. Further, if the entire mitigation process is unable to run the price evaluation and correction process will need a set of path designations to use in evaluating whether or not the absence of mitigation had a material impact on price.

The path designations that result from the proposed approach in Section 7 can be used as the default set of path designations effective in the event the dynamic competitive path assessment does not complete successfully in the market software. The set of default path designations based on historical data from the real time market (used for mitigation of Exceptional Dispatch) will serve as the default designations for the HASP and RTUC runs of the mitigation process. The ISO will use the same methodology applied to historical data from the day ahead market to produce a set of default designations to be applied in the event of a failure of the dynamic competitive path assessment in the day ahead market.

9 Impact of the Proposal

Exceptional Dispatch Categories

The market initiative addresses the transmission related exceptional dispatch mitigation. Historical data is compiled to show the categories of Exceptional Dispatch. The historical analysis is based on data from the 12-month period August 1, 2011, to July 31, 2012. The data source is the exceptional dispatch logs, which includes both formatted and unformatted information. The analysis considers only exceptional dispatch with a “minimum go-to” and thus would most likely be subject to mitigation. All records are categorized as “System Competitive”, “TModel Competitive”, “TModel NonCompetitive”, “NonTModel”. For the category of “NonTModel”, it is further categorized by whether the Exceptional Dispatch is at dispatchable minimum generation, at minimum generation, or other (meaning either it is either not at dispatch minimum generation or minimum generation, or such information is not available).

The combined TModel cases (TModel Competitive and TModel NonCompetitive) accounts for 40% of the Exceptional Dispatch, which is subject to the current proposal rule. There is another NonTModel Other category, accounting for 14% of the Exceptional Dispatch, and part of it is subject to the current proposal rule too, if it is transmission related.

Figure 3: Relative frequency of Exceptional Dispatch by Category (Percentage)

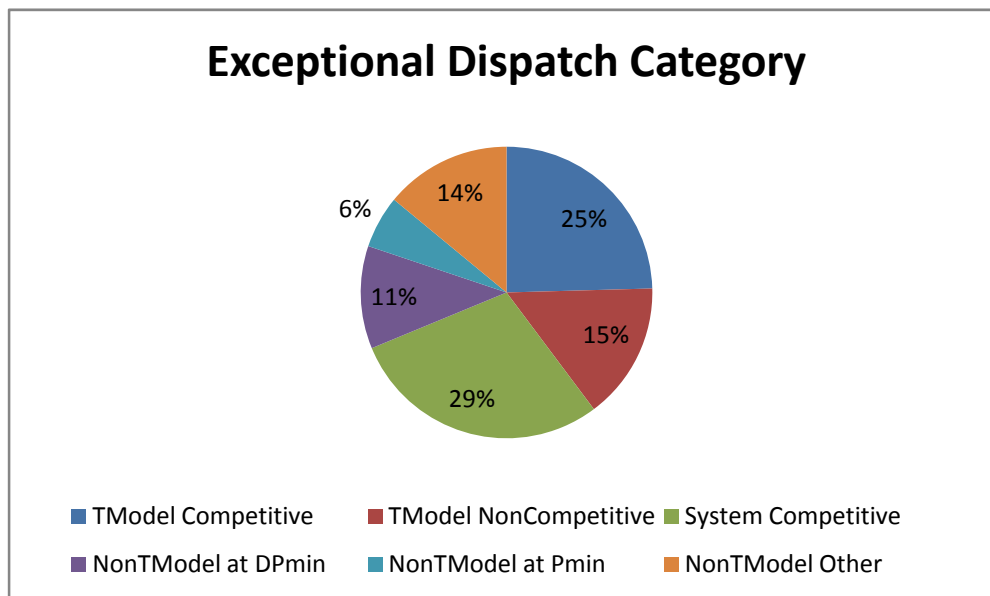
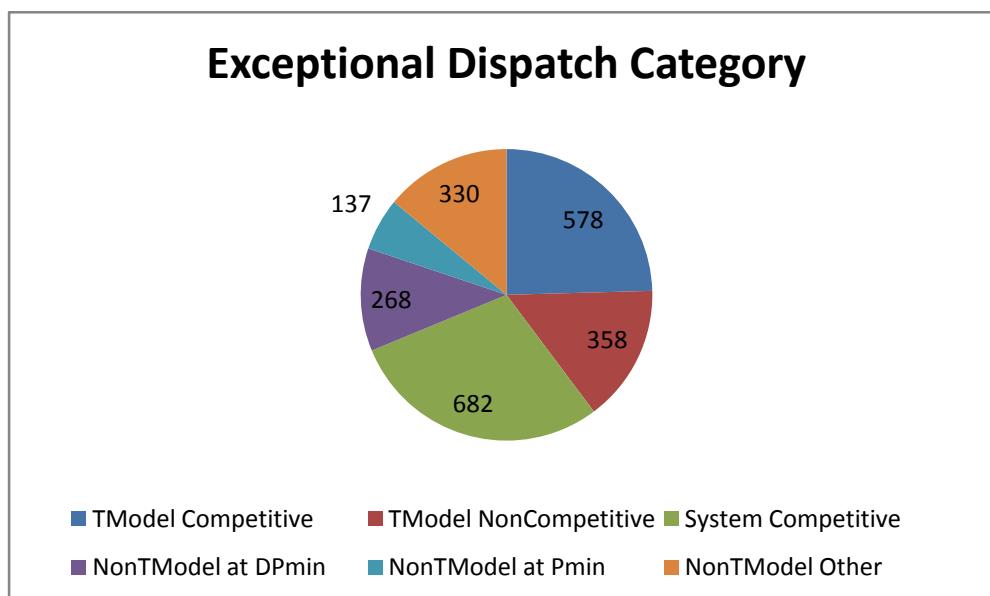


Figure 4: Absolute frequency of Exceptional Dispatch by Category (Number)



10 Next Steps

The ISO will discuss this revised draft final proposal with stakeholders during a conference call to be held on November 6, 2012. The ISO requests comments from stakeholders on the proposed market design described in this straw proposal. Stakeholders should submit written comments by November 14, 2012 to EDMitigation@caiso.com.