ERCOT Management Readiness Certification



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**MILESTONE: Nodal Go-Live**

**DATE: 12/01/10**

**PURPOSE**

This document outlines the Nodal Program Readiness Assessment for Nodal Systems Go-Live in December 2010. ERCOT continues to measure overall readiness in three areas: System Readiness, Process Readiness, and People Readiness.

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|  | |  |
| Section I  Section II  Section III  Section IV  Section V  Section VI  Section VII  Section VIII  Section IX | Certification of Overall ERCOT Readiness for Go-Live  Nodal Readiness Overview  Nodal System Readiness Assessment  Nodal Process Readiness Assessment  ERCOT Staff Readiness Assessment  Market Participant Readiness Assessment  Nodal Go-Live Legal Review  168 Hour Test Assessment  Readiness Criteria Dashboard | Ready  Ready  Ready  Ready  Ready  Ready  Ready |
| Appendix A  Appendix B  Appendix C | Nodal Protocol Risk Assessment  Remaining Activities & Issues  Nodal Program Gantt and Dashboard |  |

**NOTE: This assessment is based on the information available 10/1/2010 with the understanding that there are 8 weeks before go-live. If circumstances change ERCOT shall update the TAC and the Board.**

**SIGNOFF**

ERCOT Management signoff represents acknowledgement of the completion of the Readiness Criteria for continuing transition into Nodal Production Operations targeted for December 1, 2010.

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| --- | --- | --- | --- |
| Title | Name | Signature  (Not required – Email will count as electronic signature) | Date |
| Controller | Mike Petterson |  |  |
| VP & Chief Compliance Officer | Chuck Manning |  |  |
| VP & General Counsel and Corporate Secretary | Bill Magness |  |  |
| VP & Chief Information Officer | Richard Morgan |  |  |
| VP Grid Operations & System Planning | Kent Saathoff |  |  |
| Sr. VP & Chief Operating Officer | Mike Cleary |  |  |
| President & Chief Executive Officer | Trip Doggett |  |  |

# Certification of Overall ERCOT Readiness for Go-Live

Declaration of ERCOT Management Certifying ERCOT Readiness for Nodal Go-Live

The Electric Reliability Council of Texas (“ERCOT”) Management Team hereby certifies as follows:

1. The Nodal systems necessary for Go-Live are complete, and have been tested adequately for ERCOT to make the declaration of market readiness required by the ERCOT Zonal Protocols, in order to authorize Nodal Go-Live on December 1, 2010; ERCOT’s assessment of the system readiness is based on the successful completion of Market Trials and the quality of solution.
2. ERCOT operating and business processes that will support the operations of the Nodal market have been documented, reviewed, and exercised during End-to-End testing and Market Trials to provide the necessary process documentation for ERCOT to make the declaration of market readiness required by the ERCOT Zonal Protocols, in order to authorize Nodal Go-Live on December 1, 2010; ERCOT’s assessment of the process readiness is based on Business Manager signoff on procedure completion.
3. ERCOT has provided education and training activities for both ERCOT and Market Participant personnel as part of Nodal market implementation. ERCOT’s assessment of the readiness of its personnel is based on results of education programs, reports from managers, and the performance of ERCOT personnel during Market Trials. ERCOT’s assessment of the readiness of Market Participant personnel is based on the level of participation in Nodal training programs and on Market Participant performance during Market Trials. Based on these sources of information, as well as experience with ERCOT and Market Participant personnel, we are prepared to make the declaration of market readiness required by the ERCOT Zonal Protocols, in order to authorize Nodal Go-Live on December 1, 2010.

Executed on: October 1, 2010 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Nodal Readiness Overview

As of October 1, 2010, the ERCOT Nodal Program has achieved critical milestones toward the successful delivery of the Nodal Solution to begin Operations on schedule for December 1, 2010. The Market Trials quality of solution demonstrated during the 168 hour full system reliability test built confidence within ERCOT and among external stakeholders. As the Program transitions into the cutover period the ERCOT team is confident in the continued success of the remaining program activities.

On a weekly basis, the ERCOT team will continue to track critical milestones and provide updates to the Board of Directors. If ERCOT Management and/or the Board of Directors determines that there are significant issues that could jeopardize Go-Live, they may decide to re-assess the readiness declaration.

In compliance with Zonal Protocol section 21.12.3 “***Notice to Market Participants of Effective Date for Nodal Protocol Provisions and Retirement of Zonal Provisions”,*** ERCOT must certify that Market Readiness Criteria have been met.

ERCOT has categorized the Market Readiness Criteria into three areas necessary for successful Nodal Operation: System Readiness, Process Readiness, and People Readiness.

1. **System Readiness** – evaluation of the Nodal Information Technology systems’ ability to support the market design.

* Core system functionality delivered to meet Protocol requirements
* System Integration delivered to meet Market Timelines and Business Processes
* Defect and Market Issues required for go-live have a defined resolution plan
* Active Readiness Metric Status evaluation

1. **Process Readiness** – evaluation of ERCOT processes and procedures needed to support the market design

* ERCOT Business Processes and Procedures developed to support Nodal requirements
* ERCOT and Market Participant transition activities for Go-Live established and communicated.
* Nodal and Zonal Protocol transition dates identified and communicated

1. **People Readiness** – evaluation of ERCOT employee readiness and Market Participant knowledge to support the market design

* ERCOT staff supporting Market Trials system execution, problem resolution and market questions
* ERCOT staff trained on Systems and Processes
* Market Participation in Market Trials and ERCOT Training classes

1. **Nodal System Readiness Assessment**

ERCOT’s Nodal System Readiness Assessment concludes that Nodal Systems are ready for Go-Live.

***Nodal System Integration and Operational Testing***

Since late 2009, ERCOT business and technical teams have done extensive internal Integration and Operational testing to identify and remediate software, data, and design defects. As part of the Nodal Program timelines, four Major phases of software functionality were completed providing key functionality for Market Testing.

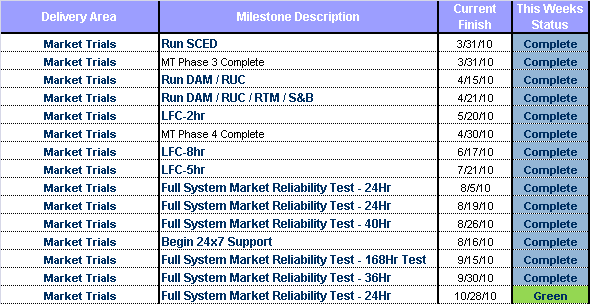
On May 3, 2010 the ERCOT Nodal Program completed the milestone Phase 5 - Full Functionality delivery for Market Testing. This delivery provided pre-production systems for ERCOT staff and Market Participants to ramp-up to simulating full operational day scenarios and results analysis covering Day-Ahead through Settlements activities.

The following Program Milestone completion documentation were prepared and signed off by Business, Project, and Program Management:

* Testing Sign-off Document Phase 3.0 Baseline
* MT3.0 Entrance Sign-off Document
* Phase 3 Program Milestone Signoff Document
* MT4.0 Entrance Sign-off Document
* MT5.0 Entrance Sign-off Document
* Phase 4 Program Milestone Signoff Document
* Phase 5 Program Milestone Signoff Document

***Nodal Market Trials System Validation***

Since February 2010, Market Trials activities exercised ERCOT and Market Participant systems, identifying software, data, and market rules issues and improving overall system quality necessary for Nodal Go-Live. The Market Trials effort completed the following activities and milestones:



***Nodal Information Technology Readiness***

Monitoring has been deployed for all Nodal systems, including business-level dashboards, real-time alerting, longer-term trend analysis and end-user monitoring. Additional monitoring will continue to be deployed up to Go-Live in response to business requests.

Multiple security assessments have been performed by an external security vendor, focusing primarily on application security and external compromises. There are no outstanding Critical or High vulnerabilities and the security vendor has not identified any security risks that would prevent a Nodal market launch.

Security audit checks have been performed on all the Nodal servers and databases and all NERC CIP critical assets are re-scanned following every change made to the systems. SAS/70 assets are scanned on a quarterly basis for audit compliance and vulnerability assessment.



All systems requiring site failover have been tested and verified multiple times and the Nodal systems in their entirety have been run out of both data centers to validate the topology and configuration.



ORT Project dashboards with supporting details can be found on the ORT SharePoint site.

***Previous Nodal Certifications***

ERCOT, TAC, and the Board certified the readiness of the following systems and processes that were placed in service as part of the Nodal Go-Live sequence.

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| --- | --- | --- | --- |
| ***System*** | ***ERCOT Certification*** | ***TAC Certification*** | ***Board Certification*** |
| NMMS | Jun 30, 2010 | Jul 1, 2010 | Jul 20, 2010 |
| CRR | Aug 4, 2010 | Aug 5, 2010 | Aug 17, 2010 |
| OS | Aug 4, 2010 | Aug 5, 2010 | Aug 17, 2010 |

***168 Hour Test Completion***

168 hours of continuous Nodal system testing was completed without encountering any major system issues that would prevent the Nodal Market from going live, while maintaining system security and reliability as required by the ERCOT Protocols, Operating Guides, other binding documents, and NERC Reliability Standards.

ERCOT is confident with the Dec 1 Go-Live date and has provided a test summary report to TAC and the Board outlining the successful completion of this test. See Section VIII for the 168 hour testing report summary.

***Quality of Solution Improvements***

ERCOT emphasized quality of solution as a priority leading up to and during the 168 hour test. Market participants were asked to provide accurate data in their Current Operating Plans (COPS), real-time telemetry of Resource Limits and Bids and Offers in DAM that were representative of how they plan to operate. The result of this emphasis was a successful 168 hour test that allowed ERCOT and the market to analyze the results and to ensure that the real-time dispatch, congestion management and DAM clearing were realistic given the inputs. The list of items below provide details to the issues and improvements that were made and contributed to solutions that were reasonable and acceptable for DAM and real-time operations.

**Day-Ahead Market**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * Load Distribution Factors (LDFs) produced by the automated process delivered unacceptable results during market trials. | * Before the 168 hr test implemented methodology to use static LDF values * During 168 hr test began using updated software that made a change so that DAM would not constrain elements serving radial load pockets. * LDF methodology presented to NATF on 9/22 and 9/30. | * LDF methodology scheduled to go TAC for approval in October * Generating LDFs for December * Continue to evaluate LDFs |
| * Phase Shifter Transformers (PSTs) settings causing overloads in the DAM | * During 168 hr test started to identify elements to not secure and ‘monitor only’ due to the PSTs. Currently about 22 elements have been identified as monitor only. | * ERCOT is developing procedures to analyze PSTs to determine the best setting to use for minimizing overloads. ‘Monitor Only’ elements list will continue to be managed. |
| * Consideration of System Protection Schemes (SPSs) in DAM | * Code migrated before 168 hr test to correct mishandling of some SPSs. | * Modeling Corrections and Quality Assurance will continue |
| * Questionable contingencies causing overloads in DAM | * Automated contingency generation tool produced some invalid contingencies due to modeling issues. NOMCRs were submitted to correct. * Teams working to review the contingencies with auto transformers. * CIM Importer issue with series devices to be fixed in MMS5P10 | * Request to TSPs to review specific contingencies (including auto transformers) has been made. * NOMCRs submitted to be implemented in the 10/15 database load. * Continue to review the contingencies. |
| * Not correctly modeling Generic Constraints and PCAPs not being considered in DAM | * Process is in place to determine and send to DAM operator the generic constraints and PCAPS predicted to be used in RT. | * Continue to refine the process. |
| * Modeling Issues :   + Ratings   + Impedances   + Default load values | * Work has been done to compare various sources of the data and to question differences with the TSPs. | * Modeling Corrections and Quality Assurance will continue |
| * DAM performance issues related to PTP Option offers | * Executed non-binding survey and performed testing to identify solutions | * Exercise process to filter the full contingency list. Accelerate upgrade of hardware project |

**Reliability Unit Commitment (Daily & Hourly)**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * Poor Quality COPs   + COPS data different from Resource Plans and therefore suspect. | * Noticeable improvement as we progressed through Market Trials. This issue will likely be less of an issue once Nodal settlements kicks in. * Operators are calling QSEs every day before DRUC run and if needed before HRUC run to correct COP issues. | * Pick several days in the end of October in which it is requested that the QSEs should enter COPS that reflect how they plan to cover their obligations and operate their Resources. |
| * Mis-interpretation by RUC of null Start-up and Minimum Energy Offers | * Defect has been submitted on mishandling of null Start-up and null Minimum Energy offers. Fix deployed to NPROD | * Run DRUC and HRUC during the last few weeks in October including the LFC test |
| * MMS doesn't optimize phase shifter tap position | * RUC set to also “monitor only” those elements associated with the PSTs and also the RUC operators procedures instructs them to use updated PST settings * Procedures in place for Shift Engineers and operators to update the phase Shifter tap position as system conditions changes | * Run DRUC and HRUC during the last few weeks in October including the LFC test |
| * Slow execution times | * COP data reflecting ERCOT to be short is primary reason. Continue to evaluate parameter settings that can speed up process. * Procedures in place for Shift Engineers and operators to proactively take manual action to resolve unsolvable constraints | * Will continue to monitor |
| * RUC Operator Screens usability needs improvement | * Work in progress and this is not critical for Go-Live. | * Will continue to monitor |
| * RUC Operators were unable to deselect Resources and set a few parameters | * Resolved during 168hr test by software fix | * Will continue to monitor |

**Real-Time Market**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * Offers not covering entire HSL of Resource | * Outreach has helped. NPRR 240 is at the BOD for approval. * Seen improvement of on average of 2000MWs during the LFC test * NPRR 240 approved 9/21 | * Will continue to provide insight and education to MPs |
| * Poor Telemetry | * Significant issue during 40 hr LFC test. Should be resolved by change implemented by MPs * NPRR on Resource Limit Calculator (RLC) calculation in draft should help mitigate issue. | * Will continue to monitor. |
| * Start-up and Shut down issues | * Business Practices written to provide guidance. For go-live use "ONTEST" as RST for both Start-ups and Shut-downs. NPRR in progress to specify to use “ONTEST”. | * NPRR scheduled to go to PRS to clarify the usage of on-test RESOURCESTATUS |
| * Inaccurate Ratings | * Early LFC tests revealed inaccurate rating in the model and in some cases being telemetered. ERCOT implemented review process for binding constraints showing up in Real time. (Review contingency and ratings) | * Will continue to monitor and correct as required |
| * Questionable Contingencies | * Automated contingency generation tool produced some invalid contingencies due to modeling issues. NOMCRs were submitted to correct. * Teams working to review the contingencies with auto transformers. * Contacted TSPs requesting verification of transformer isolation. | * Request to TSPs to review specific contingencies (including auto transformers) has been made. * NOMCRs submitted to be implemented in the 10/15 database load * Continue to review the contingencies. |
| * Energy Offer Curve being rejected in Real Time.  (This is a timing issue.) | * Known defect being investigated * Fix in 10/1 NPROD migration | * Verify fix in NPROD in October |
| * Shift factor transfer issues | * Resolved with code updates * No issues in the 168HR test * None observed during Sept 29-30 Nodal System test | * Will continue to monitor |

**Network Modeling Management System**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * Multiple System restarts   + The restarts caused MP input to be lost resulting in significant delays for MP’s to input Model data. | * Stability issue was improved with a system patch that was applied on July 1st, 2010 * The last restart occurred on 9/05/2010, but not related to the original issue | * Continue to monitor restart activity to ensure system meets goal of 1 or fewer unscheduled restarts per week. Currently the system is meeting or exceeding the goal |
| * Market Participants and ERCOT had differing opinions on several items involving modeling such as:   + Definition of interim updates   + How to place NOMCRs into service   + Using Outage scheduler for energizing new equipment | * ERCOT released the Modeling Expectations white paper and worked with the TSPs in several subcommittees to reach a market agreement * Approved by NATF | * Continue to work with all Market Participants as it relates to the Network Modeling and the TSP issues list in the various subcommittees |
| * System navigation was slow   + The response time for navigating through various layers of equipment increased | * Navigation performance issues improved Aug 1st (43% reduction in response time) | * Continue to monitor system performance and assess MP helpdesk tickets to ensure performance continues to meet expectations. |
| * Slow validation times for users   + The validations which normally take 10-40 minutes were taking 20-40% longer than expected | * Validation performance improved August 27th (40% reduction in validation time) | * Continue to monitor system performance and assess MP helpdesk tickets to ensure performance continues to meet expectations. |

**Credit Management and Monitoring**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * **CMM (Core) Credit**    + Large exposure and credit calls in the market     - Some Market Participants experienced swings in collateral calls within the market | * In conjunction with the 168-hour test, ERCOT reset Market Trials data that was causing the core credit calculation to be high   + Provided CPs that were behaving “normally” during the 168-hour test an opportunity to see what their credit calculation would be after “go live” | * Review 168-hour activity with CPs, individually and within MCWG and CWG, as needed. |
| * **DAM Credit Constraint**   + Available credit on non-business days     - *When DAM was run over the weekend in August, a significant amount of credit was consumed* | * ERCOT credit staff to update ACLs on non-business days | * ACLs will be updated on non-business days with a manual workaround until an after Go-Live automated solution is implemented |
| * **CRR Credit Constraint**   + Two parameters (the Multiplier (M) and Adder (A)) used in the auction to collateralize initial mark to market are under review | * Anticipate a request to change at least the Multiplier at the Oct BOD meeting to correct for understanding of how the parameter is used in CRR system | * Review at TAC on October 7 , 2010 |

**MIS Reports and Extracts**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * QSE Ancillary Services Capacity Monitor report on the MIS   + Values reported for AS responsibilities different from the values observed in the source system | * The report is not active at this time, release data is not yet established   + The report needs to be validated by business in iTest before it can be released in Production.   + Still working to get an estimate for the NPROD delivery date | * Complete validation |
| * Two Credit reports are not functioning   + Future Credit Exposure for CRR PTP Options (FCEOPT) Detail Report   + Future Credit Exposure for CRR PTP Obligations (FCEOBL) Detail Report | * NPRR 241 allows ERCOT to not provide these reports and/or allows ERCOT to provide an extract instead. * NPRR 241 approved by the Board | * ERCOT is working on an extract of the data |
| * Some reports have errors, such as:   + Forecasted Temp. Adj. Dynamic Ratings Duplicate Data: Each timestamp row of data is duplicated | * ERCOT has open defects on the report   + Duplicate data issue has been resolved   + Fix for duplicate data resulted in an additional defect for a broken sort order for this report   + This fix is still in development | * Complete and implement sort order fix * Complete validation |
| * Missing intervals for posting Real Time SPPs | * Development is currently working on a solution to update the retry logic and change the scheduling of the report to account for missed report postings when pricing data is available. | * Fix to be developed and implemented.  Report to go back through itest and business validation |
| * Dashboards are not yet on in NPROD | * The dashboard defects are currently in itest | * Complete validation |

**Settlement & Billing, Metering, and Data Aggregation**

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| **Quality of Solution Issues Identified** | **System and Data Improvements** | **Planned Resolution for Go-Live** |
| * Generation Resource Base Point Deviation Charge defects and known issues:   + TELHSLFLAG Bill Determinant (Defect): The exemption logic for units during startup is inaccurately exempting resources, based on the data being provided to settlements   + TWTG Bill Determinant (Defect): the calculation for TWTG is not built per protocol; it is performing a simple average of the telemetered generation over the settlement interval, rather than doing a time-weighted average based on SCED intervals   + IRR Base Point Deviation Settlement (Known Issue): While the system is built per protocol, the protocol formulas are inappropriately resulting in charges to IRR during non-curtailment intervals, and do not charge IRR during intervals of negative prices.   + AABP Bill Determinant (Known Issue): While the system is built per protocol, when there are short SCED intervals the AABP formula, as defined, can calculate an overstated Adjusted Aggregated Base Point which may result in a charge to the QSE | * Various protocol revisions provide improvements:   + *NPRR 273, Allow use of the ONTEST Resource Status to Indicate Resource Startup, Shutdown, and Test Operations*. This NPRR allows settlements the ability to use the ONTEST status to give exemptions for Base Point during startup and shutdown. The ONTEST status can be leveraged as an efficient and effective resolution to the TELHSLFLAG defect and has been proposed by some in the market as a more desirable approach to this exemption. This solution only requires a minor system change (as opposed to the corrections required for the original TELSHSLFLAG logic/design.) The change is ready in a test environment and is pending board approval.   + *Draft Base Point Deviation NPRR at QMWG.* While still under discussion, this NPRR focuses on an interim solution that can be achieved for go-live, and includes grey-box protocol changes that will support a better long-term solution. This draft NPRR addresses the known issues regarding protocol direction for IRR Base Point Deviation settlement and the AABP formula. * Given the tolerances that are built into the Base Point Deviation, the variance between the TWTG as currently calculated and per protocols should not be material enough to result in a Base Point Deviation charge. This issue will be contemplated during in QMWG discussions and work on the draft Base Point Deviation NPRR. QSEs have the opportunity to dispute the charge type if the TWTG defect actually causes the QSE to incur a charge. | * Continue to provide market support regarding discussions of NPRR 273 discussions. Continue to work with the market to identify interim and long-term options for Base Point Deviation settlement protocol revisions. * If an NPRR is not implemented before Go-Live, use dispute process to resolve mis-calculations. |
| * Quick Start resource participation and settlement (known issue): *NPRR 272, Definition and Participation of Quick Start Generation*, includes revisions that provide for SCED dispatch of quick start units. The changes merit additional changes within settlement to provide Base Point Deviation exemptions. | * ERCOT staff has discussed this NPRR at both WMS and PRS. The proposed settlement change to provide an exemption for Base Point Deviation is minor and is ready in a test environment, pending board approval. | * Continue to provide market support for NPRR 272 discussions. |

***Defect Status***

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| --- | --- | --- | --- |
| **System** | **Defects to be resolved by go-live** | **Deferred Defects** | **Comments** |
| **MMS** | Total : 17 | Total: 63 | ***Delivery Schedule***   * 17 Defects to be resolved by 11/05   ***Deferred Defects***   * 51 Deferred defects require a workaround, 48 workarounds in place and exercised. 3 in progress to complete by 10/05 |
| **EMS** | Total: 19 | Total: 347 | ***Delivery Schedule***   * 19 Defects to be resolved by 11/05   ***Deferred Defects***   * 119 Deferred defects require a workaround, 116 workarounds in place and exercised. 3 in progress to complete by 10/05 |
| **COMS** | Total: 2 | Total: 62 | ***Delivery Schedule***   * 2 Defects to be resolved by 10/17 (test completion on 10/08, must migrate on Retail Outage Cycle)   ***Deferred Defects***   * 34 Deferred defects require a workaround, all 34 workarounds in place and exercised |
| **CMM** | Total: 1 | Total: 51 | ***Delivery Schedule***   * 1 Defect to be resolved by 10/08   ***Deferred Defects***   * 12 Deferred defects require a workaround, all 12 workarounds in place and exercised |
| **MIS** | Total: 24 | Total: 9 | ***Delivery Schedule***   * 24 Defects to be resolved by 10/15/2010   ***Deferred Defects***   * 2 Deferred defects require a workaround, both workarounds in place and exercised |
| **NMMS** | Total: 0 | Deferred: 10 | ***Delivery Schedule***   * None   ***Deferred Defects***   * 9 Deferred defects require a workaround, all 9 workarounds in place and exercised |
| **OS** | Total: 1 | Total: 125 | ***Delivery Schedule***   * 1 Defect to be resolved by 10/08   ***Deferred Defects***   * 39 Deferred defects require a workaround, all 39 workarounds in place and exercised |
| **CRR** | Total: 3 | Total: 5 | ***Delivery Schedule***   * 3 Defects to be resolved by 10/08   ***Deferred Defects***   * 3 Deferred defects require a workaround, all 3 workarounds in place and exercised |
| **EIP** | Total: 4 | Total: 62 | ***Delivery Schedule***   * 4 Defects to be resolved by 10/15   ***Deferred Defects***   * 7 Deferred defects require a workaround, all 7 workarounds in place and exercised |
| **CDR** | Total: 16 | Total: 7 | ***Delivery Schedule***   * 16 Defects to be resolved by 10/15   ***Deferred Defects***   * 4 Deferred defects require a workaround, all 4 workarounds in place and exercised |
| **EIS** | Total: 17 | Total: 8 | ***Delivery Schedule***   * 12 Defects to be resolved by 10/15 * 5 defects to be resolved by 11/19   ***Deferred Defects***   * 5 Deferred defects require a workaround, all 5 workarounds in place and exercised |

The defect details above are a snapshot on 10/01/2010. After this signoff there may be additional defects identified. Going forward the ERCOT team will continue to track defects and provide updates.

Full defect details are available on the Nodal Website under the Documents Tab > Nodal Program Office > All Issues section <http://nodal.ercot.com/docs/po/index.html>

***Nodal Individual System Sign-off***

Zonal Protocol section 21.12.3 requires that ERCOT certify that all Market Readiness Criteria have been met before prior to starting operation of any specific functionality. The Nodal team has created a set of Readiness signoff documents across key Nodal systems to support overall Nodal Readiness. Specific criteria evaluated in each document are available in section seven of this document ‘VII - Readiness Criteria Dashboard’.

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| --- | --- | --- |
| Document | Approvers | Status |
| NMMS Readiness Signoff | Woody Rickerson  Kent Saathoff | Signoff Complete |
| OS Readiness Signoff | Bill Blevins  Joel Mickey | Signoff Complete |
| CRR Readiness Signoff | Matt Mereness  Betty Day | Signoff Complete |
| EMS/MMS Readiness Signoff | Bill Blevins  Colleen Frosch  Matt Mereness  Steve Reedy  Joel Mickey  John Dumas | Signoff Complete |
| COMS Readiness Signoff | Mandy Bauld  Jackie Ashbaugh  Don Tucker  Betty Day  Vanessa Spells  Cheryl Yager | Signoff Complete |

**IV. Nodal Process Readiness Assessment**

ERCOT’s Nodal Process Readiness Assessment concludes that Nodal Processes are ready for Go-Live.

***Business Process Readiness Assessment***

***ERCOT Nodal Operating Guides Updates***

The Operating Guides, which supplement the ERCOT protocols, describe the working relationship between ERCOT and the entities within the ERCOT system that interact with ERCOT on a minute-to-minute basis to ensure the reliability and security of the ERCOT system. ERCOT Compliance has verified that Nodal Protocols are consistent with NERC Reliability Standards Requirements.

As part of the Nodal Market Rules governance process, the Nodal Operating Guides have been updated per Section 1.3 of the Operating Guides, the change control process established to announce, develop, revise, and approve the Nodal Operating Guides.

***ERCOT Business Procedures***

The Nodal Program working with ERCOT business managers have defined and documented the set of Business Procedures required to support Nodal Operations. These procedures were documented, reviewed, and relevant procedures were used to support Nodal System testing during Internal Operational and Market Trials testing.

Nodal Procedures were grouped into 5 major process categories containing 17 lower level process areas with 198 business procedures identified as shown in the table below. All of the identified Procedures have been signed off by ERCOT Business Managers. Procedures were exercised in market trials and passed by ERT observers or the business unit manager as required to support Market Trials activities.



***IT Process Readiness Assessment***

Run Books and other operational documentation have been developed to codify the operation of the Nodal systems and provide a repository for procedures, including installation of software packages, conducting site failovers, and recovery from interruptions of service.

Failover procedures have been developed, documented and verified for all Nodal systems requiring failover; these include both local and site failover.

Incident Response processes are being adapted from the current production processes and applied to Nodal systems. Service Level Agreements (SLAs) for the systems have been drafted and mechanisms are in place to measure and report compliance to these SLAs for both Availability and Performance. These SLAs have been reviewed and approved by business owners.



***ERCOT Cutover and Go-Live Plan***

The ERCOT Nodal Program has established a Cutover Project that is planning and communicating the key cutover and Go-Live activities. Ongoing Market Participant Readiness Seminars are being held to communicate key activities and milestones for transitioning into Go-Live.**V. ERCOT Staff Readiness Assessment**

ERCOT’s Staff Readiness Assessment concludes that ERCOT staff is ready for Go-Live.

***ERCOT Staff Supporting Market Trials***

In support of Market Trials, ERCOT staff has conducted a variety of activities to assist the Market in understanding the market solutions and timelines. These include the following activities during Market Trials:

* Executing Systems and validating business processes
  + This includes performing many business scenarios, both positive and negative, to verify the business and technical processes
* Supporting Analysis and Problem resolution
  + Daily Market Trials solution and output review
    - Operations, Market, Settlement output review
  + DAM Deep Dive conference calls twice weekly during Market Trials and including a variety of issues such as:
    - Contingency definition
    - Line ratings
    - Bidding behaviors and implications
* Supporting Weekly Market Meetings, Questions, Education
  + Market Participant Handbook development
  + Scheduled Market Calls
* ERCOT staff executing and supporting 168 hour test
  + Includes full systems test with a built in 48 hour closed-loop full system reliability test
  + Daily calls to recap each day of the 48 hour test including a variety of significant analysis effort to examine the solutions and share any findings with the participants
  + ERCOT staff executing many different system reliability tests to gain experience with the real-time systems and validate the reliability of the system to effectively manage and secure the ERCOT Transmission System.
* Operating procedures have been exercised in market Trials and passed by ERT observers or the business unit manager as required to support Market Trials activities.

***ERCOT Business Staff Trained on Nodal System and Processes***

ERCOT leadership has ensured their staff is properly trained and has the necessary toolsets and access to support the Nodal systems and processes. Business owners worked with the Nodal ERT project to identify training tasks required to adequately prepare staff to operate a Nodal Market. The efforts included:

* Tailored training for ERCOT staff based on identified department needs
* 1799 Training needs were identified, and have been completed, or equivalent knowledge certified
* The Help Desk has been provided with sufficient instruction on how to handle and respond to Nodal incidents and perform appropriate escalation.
* Resource matrices have been developed and published to support teams in order to ensure adequate coverage during both business and non-business hours.
* 4,400 man-hours of classroom nodal systems training have been supplied to ERCOT personnel.



**VI. Market Participant Readiness Assessment**

ERCOT’s Market Participant Readiness Assessment concludes that Market Participants are ready for Go-Live.

**Market Participation in Market Trials**

Participant Readiness is one of the keys to successful nodal market implementation. The Go-Live date of December 1, 2010 is dependent on the Market Participants ability to fully participate in Market Trials, and on the completion of their internal readiness activities before and during Market Trials. The internal readiness of any Market Participant is ultimately outside ERCOT’s control; however, through the Market Trials participation and communications with the Market Participants on a weekly basis. ERCOT believes the Market Participants are ready.

***Market Participation***

Through Market Trials, 100% of the QSEs with Resources have participated and demonstrated the ability to submit Three Part Offers (TPO) and Current Operating Plans (COPS). QSE’s without resources have also demonstrated their ability to participate with the exception of 10 QSEs w/o resources have never submitted to DAM. Since the DAM is a voluntary market, ERCOT Management does not believe the 10 outliers will impact go-live.

Based on this participation, over 30 weeks of Market Trials testing was performed including 6 months of SCED execution and LMP generation and approximately 200 hours of Load Frequency Control testing.

***Day-Ahead Market Participation***

|  |  |
| --- | --- |
| Total # DAM Runs | 104 |
| QSEs w/ Resources (max runs) | 104 |
| QSEs w/ Resources (average runs) | 93 |
| QSEs w/ Resource (min # runs) | 32 |
| QSEs w/o Resources (max # runs) | 104 |
| QSEs w/o Resources (average) | 69 |
| QSEs w/o Resources (min # runs) | 0 |

**Statistics between 4/1/10 – 9/17/10**

**State Estimator Statistics**

|  |  |
| --- | --- |
| Closed Loop Test | SE Convergence |
| 24-HR Test, Aug4-5 | 97.96 |
| 24-HR Test, Aug19-20 | 99.09 |
| 40-HR Test, Aug26-28 | 99.60 |
| 48-HR Test, Sep12-14 | 99.66 |



The steadily ascending State Estimator convergence scores from the past several system-wide tests are indicative of the continuing improvement and increasing robustness of the Nodal EMS data inputs, particularly network model and telemetry data, and also the fine tuning of the EMS programs themselves.  The continually passing grade of >97% convergence indicates that the Real-Time Network Security Analysis (State Estimator) is functioning very well and is ready for deployment as a production system.

**Resource Dispatch Performance Results**



**Frequency Performance**

|  |  |
| --- | --- |
| Closed Loop Test | CPS1 Scores |
| 24-HR Test, Aug (4-5) | 129 |
| 24-HR Test, Aug (19-20) | 137 |
| 40-HR Test, Aug (26-28) | 146 |
| 48-HR Test, Sep (12-14) | 156 |



During the Full-System Market and Reliability tests, frequency control has continued to improve. The CPS1 scores can be seen to be similar to values observed under Zonal control and are well above the 100% requirement level. A main contributor to this frequency performance has been the ability of the QSEs to control their Resources using Nodal systems. This performance has also improved with subsequent Full-System testing.

***Readiness Scorecard***

ERCOT and Market Participant stakeholder groups collaborated to define a set of Readiness Metrics for both ERCOT and Market Participants activities in Market Trials. These metrics have been tracked in the Readiness Scorecard tool. The Nodal Readiness Scorecard provides high-level measurements of ERCOT’s and Market Participant’s progress towards operating a Nodal Market.

**Market Participant Training**

Training has been an integral part of ERCOT’s effort to facilitate Market Participant readiness for the Nodal market. ERCOT has been delivering Market Participant training through instructor led and web-based courses covering the market rules and processes of all major components of the nodal market since 2006. A comprehensive curriculum of courses was developed by Market Participants and adopted early during the transition. ERCOT was tasked with the development and delivery of the training and market participants were highly encouraged to incorporate training into their readiness plans and determine the level of training needed to prepare them for the nodal market. ERCOT periodically provided training attendance statistics to Market Participant Accountable Executives as a benchmark to help determine their company’s readiness.

ERCOT’s training and Client Services teams have been available to support Market participants training needs. The Nodal Training Website provides Market Participants with the tools and guidance to define their training needs.

The Texas Nodal training courses, materials and registration process were designed to facilitate entry and participation in the Nodal market. Courses focus on Nodal terms and processes, the Nodal impacts on business and operations, readiness requirements, and sources for additional Nodal information.

Key accomplishments from the ERCOT Training Program include:

* Approximately 4,500 individuals from more than 300 registered market participants attended one of more ERCOT training sessions (4 year period).
* The 300 registered market participants included
  + 115 Qualified Scheduling Entities (QSEs)
  + 83 Resource Entities
  + 87 Load Serving Entities (LSEs) (75 REPs and 12 NOIEs)
  + 35 Transmission and Distribution Service Providers (TDSPs).
* Another 900 individuals that are not directly affiliated with registered market participants (consultants, PUCT employees etc…) attended training
* ERCOT employees and contractors (over 1100) also attended Nodal training sessions.



In addition to the formal training program focused on the rules of the Nodal market, ERCOT facilitated several one-time training sessions on specific processes and procedures in support of various phases of the transition to the Nodal market. These activities included the following:

* Web-based user interface training modules for systems the Market Participants use in their daily interactions with the Nodal market:
* CRR User Interface Training
* Outage Scheduler User Interface Training
* Market Manager (Market Management System) – available Sep 2010
* Market Information System - – available Sep 2010
* Targeted workshops delivered to provide details on processes and procedures
* Verifiable Cost workshops
* Settlement Workshops – CRRs
* Settlement Workshops – Day-Ahead Market
* Settlement Workshops – RUC and Real-Time Operations
* Credit Management
* Network Modeling
* Outage Scheduling
* Seminars and workshops targeted at overall market readiness or specific market segments
* Nodal Market Workshop for Retail Electric Providers
* Annual operations training seminar (attended by more than 500 ERCOT system operators)
  + 2009 - Four days of training on fundamentals of the Nodal market
  + 2010 - Training on wind generation and outage scheduling

**Market Readiness Seminars**

ERCOT conducted six Market Readiness seminars to provide Market Participants transparency into the Market Trials and Cutover phases of the Nodal Program. The seminars had a range of attendance ranging from approximately 30 to 150 people and Webex attendance of approximately 110 to 150. TDSPs, QSEs with and without Resources, and software vendors were represented.

* MRS #1 – January 28 – Market Trials Roadmap, Phase 3.0 Kickoff, Review of Phase 3.0 Market Trials Handbooks
* M RS#2 – March 25 – Phase 4.0 Kickoff, Review of Phase 4.0 Market Trials Handbooks, Telemetry Outreach, Individual LFC Testing (150)
* MRS#3 – April 29 – Phase 5.0 Kickoff, Review of Phase 5.0 Handbooks (36)
* MRS#4 – May 25 – Cutover timeline, communication, and Market Participant responsibilities (28)
* MRS#5 – July 28 – 168 Hour Test Review, Cutover activities and milestones, general Readiness update
* MRS#6 (Webex only) –September 1- Post 168 Hour Test activities, Monthly breakdown of Cutover/Go-Live activities
* MRS#7 (Webex only) – October 1 - Remaining Full System Market and Reliability Tests, Cutover Update

**Market Participant Site Visits**

As part of the ERCOT Readiness and Transition (ERT) Project, Market Participant site visits were conduced covering 67 Participants with over 600 attendees. Overall approximately 96% of total generation and 92% of total load were represented.

Market Participants were able to select relevant topics as (outlined in the following table:

|  |  |
| --- | --- |
| **Topics** | **% of visits where topic was selected** |
| Nodal Program Update (mandatory topic) | Mandatory |
| Day‐Ahead Market Implementation | 100% |
| Real Time Operations Processes & Systems | 94.29% |
| Reliability Unit Commitment Implementation | 82.86% |
| Nodal Settlements and Billing Processes | 74.29% |
| Congestion Revenue Rights Auction Implementation | 65.71% |
| Reports and Data Extracts | 45.71% |
| Telemetry & Load Frequency Control | 42.86% |
| Readiness Center and Scorecard | 14.29% |
| Credit Monitoring and Management | 11.43% |
| Wind Presentation and Discussion | One-time presentation |
| Retail Presentation and Discussion | One-time presentation |

**VII. Nodal Go-Live Legal Review**

The ERCOT Legal department reviewed whether any legal impediments exist to the use of Nodal systems necessary to begin Nodal operations on December 1, 2010. Based on this review, ERCOT Legal is aware of no legal rulings, orders, or injunctions that would prevent ERCOT from taking the steps necessary to commence Nodal operations on December 1, 2010. ERCOT Legal is also aware of no pending or threatened legal actions that would prevent ERCOT from utilizing the systems developed for Nodal operations for their intended purposes.

To date, ERCOT has complied with Zonal Protocol Section 21.12.3, Notice to Market Participants of Effective Date for Nodal Protocol Provisions and Retirement of Zonal Provisions, which requires market readiness certifications before the issuance of Market Notices regarding operations of Nodal systems and the effective dates of Nodal Protocol sections. In addition, ERCOT has timely issued the Market Notices regarding operation of Nodal systems as required by the ERCOT Protocols.

ERCOT is aware of a lawsuit, pending in Travis County District Court since 2006, which challenges the adoption of the Nodal Protocols by the Public Utility Commission of Texas (PUCT), in PUC Docket No. 31540. Three complaints originally filed in separate actions by the Public Utilities Board of the City of Brownsville, the City of Garland, and the Texas Municipal Power Agency were consolidated into one case in 2008 styled Public Utilities Board of the City of Brownsville, et al. v. Public Utility Commission of Texas [Consolidated], Cause No. D-1-GN-06-002131.

There has been no action in this lawsuit since the three complaints were consolidated into one case in June 2008. ERCOT is not a party to the lawsuit, and is not in a position to provide a definitive opinion on the merits of the plaintiffs’ claims regarding the PUCT’s order in PUC Docket No. 31540. ERCOT Legal can state with certainty, however, that the court before whom the lawsuit is pending has not issued any form of injunctive or other equitable relief that prevents ERCOT from moving forward with the operation of the Nodal market on December 1, 2010.

**VIII. 168 Hour Test Assessment**

*[Full Report that was presented at NATF is available on the Nodal Readiness Center]*

ERCOT performed the following activities as part of the 168-Hour Test:

* Congestion Revenue Rights monthly Auction for September
* Outage Scheduler synchronization and verification for outages effective during the month of September
* Day Ahead Market and DRUC from 09/09 through 9/15 operational dates :
* HRUC run 24x7 from 9/8/2010 1800 until 9/15/2010 1800
* SCED run 24x7 from 9/8/2010 1800 until 9/15/2010 1800
* Credit produced ACLs and applied limits to all downstream systems from 9/8/2010 until 9/15/2010
* Settlements continued to publish statements based on the Settlements calendar and will continue to post initial statements through 9/27/2010 for operational dates during the 168-Hour Test
* LFC / Full System Test from 9/12/2010 2:00 PM until 9/14/2010 2:00 PM

# Congestion Revenue Rights Participation Review

September Monthly Auction participation metrics:

* 9759 total bids
* 3218 Awards
* 42 Account Holders Bidding
* 52 Counterparties submitted Credit
* $8,989,008 Total auction Transaction amount
* Min bid price was $.25 in Off-peak
* Max bid price was $1000 in all three TOU

*ERCOT disposition is that this bidding profile is indicative of previous Market Trials on this voluntary market.*

# Outage Scheduling

Outage Scheduler participation metrics:

* 41 QSEs submitted ~ 858 resource outages for September
* QSE outages not entered into the Nodal system (existing in Zonal Outage Scheduler)
  + 12 QSEs had outages in the Zonal system that were not entered into the Nodal
  + 16 outages were represented by these QSEs
* 17 TSPs submitted ~ 4012 Transmission outages for September
* TSP outages not entered into Nodal (existing in Zonal Outage Scheduler)
  + 6 TSPs had outages in the Zonal system that were not entered into the Nodal system effective for the month of September
  + 23 outages were represented by these TSPs

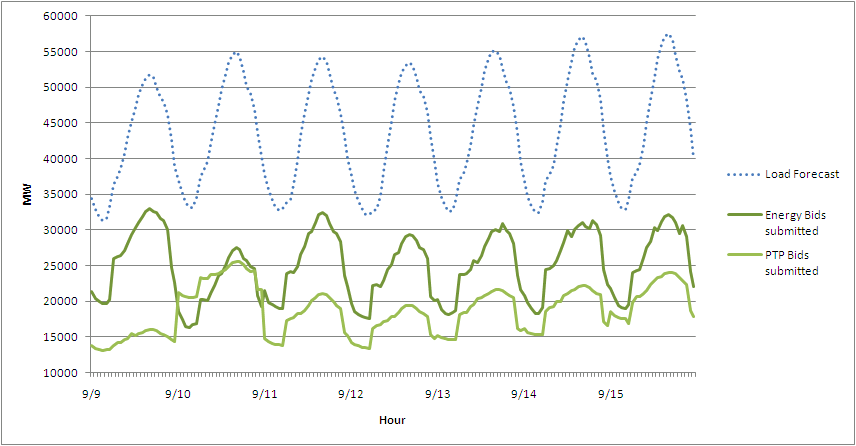
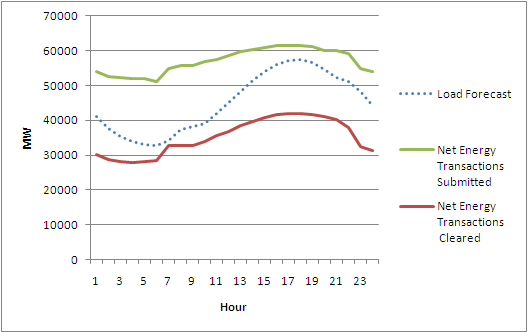
# Day Ahead Market Participation Review

DAM participation metrics (high level):

* QSEs with Resources (81 total)
  + 69/81 participated (97% generation)
  + 12/81 Opted Out (1.7% generation)
* QSEs without Resources (158 total)
  + 114/158 participated (72% of the QSEs without Resources)
  + 36 / 158 had < 25% participation
  + 8 had >= 25% and < 50% participation
  + 27 opted out

DAM Quality of Participation

* An average of 194 QSEs participated
* Net energy transactions submitted were above the load forecast
* Limiting factor for DAM clearing from a submission standpoint was the demand side
* Large quantity of bilateral trading – snapshot of total confirmed energy trades from Hour 17, OD 9/15 shows ~99,000 MW traded
* 730 / 1460 submitted across 72 QSEs
* QSE activity appeared to resemble a more post Go-Live trend (e.g. no “stress test” level activity).



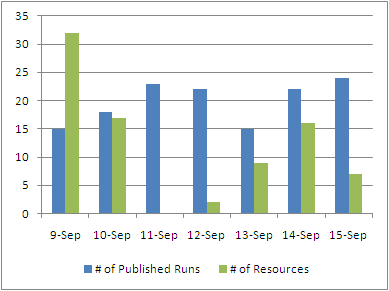
*ERCOT disposition is that there was adequate participation and sufficient knowledge demonstrated by the Market in their bidding behavior*

# Reliability Unit Commitment

RUC participation review (high level):

* Note that all de-commitments were a result of isolation issues (model discrepancies such as incorrect breaker statuses) or inconsistent / incorrect COPs.
* Following are a summary of commitments made across the duration of the 168-Hour Test following each HRUC and DRUC:

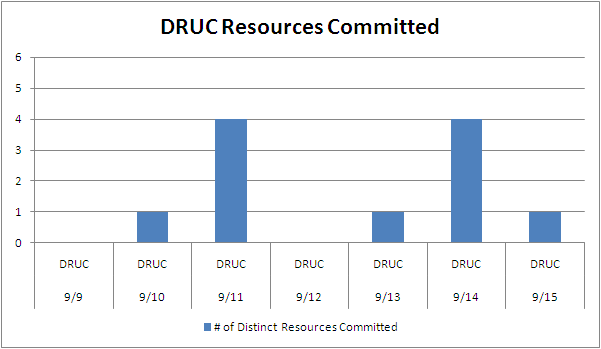
**HRUC SUMMARY**



Note that # of published runs includes those that had no approved commitments.

HRUC published runs that are less than all 24 hours are due to HRUC running over allocated times. Issues are detailed in the section covering issues discovered during the 168-Hour test.

**DRUC SUMMARY**



Note that # of Distinct Resources Committed is also impacted by de-selecting resources with shorter lead (start-up) times in order to evaluate the need in HRUC closer to the Operating Hour.

***RUC Quality of Participation***

* Initially DRUC / HRUC processing returned high level of resource commitments due to COPs that were inconsistent with resource’s actual operating status. For example, resources that were OFF (offline and available) were committed despite unit already planned to be online.
* Towards the end of the test, ERCOT operators were “de-selecting” fewer units due to improved COPs.

# Real Time Market / LFC

***RTM participation review (high level)***

* Daily percentage of expected transactions supporting the Real Time Market



***Quality of Participation***

* Quality of participation largely is accounted for in price spikes resulting from invalid telemetry and/or invalid or lack of offer curves. The following statistics outline the price spikes that would have been prevented had these issues not have been present during the 168-Hour Test.
  + The 168-Hour Test experienced 14 price spikes during the 7 day testing period:
    - 5 of these price spikes would not have occurred if HSL > MW telemetry errors were not present
    - The remaining 9 would have lasted a much shorter period of time
    - 8 of these 14 price spikes would have cleared much lower had Energy Offer Curves covered full resource capability. This is without the telemetry corrections.

*ERCOT disposition is that prices were reasonable and frequency was controlled within acceptable limits throughout the test. Largely, prices are dependent on the quality (and quantity) of Energy Offer Curves coupled with valid telemetry. All prices were explainable given the Market inputs.*

# 168-Hour Test Exit Criteria

* 168 hours of continuous Nodal systems testing have been completed without encountering any major system issues that would prevent the Nodal Market from going live while maintaining system security and reliability as required by the ERCOT Protocols, Operating Guides, other binding documents, and NERC Reliability Standards.
* ERCOT provides a test summary report to TAC and the Board outlining the successful testing processes.

# Issues and Employed Workarounds

The following types of issues were discovered and addressed during the 168-Hour test, the 168 hour testing report provides details and descriptions of each:

* MMS Server Issues impacting
  + SCED execution (9 missed intervals)
  + Increased MMS execution times
  + HRUC delays
* MMS CIM Importer
  + 121 contingencies incorrectly modeled impacting DAM and RUC
* Contingency Issues
  + 4 contingencies disabled pending further investigation
* Benefits of Phase Shifter Transformers not reflected in DAM or RUC
  + Invalid constraints in DAM and RUC solutions, resolution in place
* Notification “race conditions” caused notification(s) to be incorrectly routed (User Interface only) in rare circumstances
  + Emergency code fix implemented
  + Impact - 1 QSE received a notification intended for another QSE (no confidential data was divulged)
* DRUC initially failed due to configuration / parameter data missing
  + Data was populated and DRUC ran as expected within allocated timelines
  + Identified as an isolated incident related to fail over from the previous weekend.
  + No market facing impact
* ERCOT Operator HRUC / DRUC de-selection process not appropriately eliminating units from solution consistently
  + interim, a work-around was enacted to manually de-select these units from the database prior to approving the RUC solution
  + emergency code fix was put into place to resolve the issue
  + No Market Facing impact
* HRUC maximizing or not completing in allocated timeframe
  + Network model correction (see phase shifter issue above)
  + Configuration setting in HRUC resolved many of the performance issues
  + Remaining issues are related to COPs that are not accurately reflecting intra-day changes to resources operating statuses.
  + Impact - HRUC was not published for impacted hours while operators investigated the issue(s).
* RUC is misinterpreting NULL minimum start-up and minimum energy as $0.00 on the Three Part Supply Offer
  + Defect created with vendor
  + Work around in place to review impacted resources during approval process of RUC solutions. These resources (once confirmed) will be de-selected from the solution.
  + Impact - Misinterpretation of the null values prevented a more appropriate resource from being recommended by the RUC process.
* Duplicate DAM invoices for Operating Day 9/10/2010.
  + Root cause was human error
  + Processes will be reviewed to prevent going forward.
  + Impact - Duplicate statements received by MPs for 1 operating day.

# 168-Hour Test Evaluation Criteria

|  |  |
| --- | --- |
| **Exit Criteria** | **Evaluation** |
| Validate ERCOT and Market Participants have the proper resources and expertise to manage a Nodal system for 7 days. This will be measured by the successful adherence to internal ERCOT procedures during the 168-Hour test to be validated by the ERCOT Training Department during the test and evidenced to the market within a report. Market Participant’s Nodal Accountable Executive will self attest to their criterion. | **In the beginning of the 168 hour test, some of the HRUC executions were completed only moments before the deadline for approval. In trying to meet the approval deadline several were approved without complete review. This was soon corrected and approvals were made only after a complete review. ERCOT requests that the attestations be sent to** [**MarketTrials@ERCOT.com**](mailto:MarketTrials@ERCOT.com) **by COB Monday 9-30-10** |
| Credit – monitor credit exposures, create credit reports and accurately reflect each market participant’s credit position based on their activity during the 168-Hour test. | **All were completed as required.** |
| Validate data model accuracy between all systems including integration of the upstream NMMS system with downstream systems (e.g. DAM, MMS, EMS and CRR). This will be measured by existing ERCOT procedures. All issues observed regarding inaccurate modeling during the 168-Hour test will be reported on by ERCOT to the ERCOT Board, Independent Market Monitor, and the related Market Participant forums (NATF and TAC) as to the problem found, root cause of the error in the first place, and what process changes are being implemented to ensure that similar model accuracy issues do not reoccur going forward. ERCOT shall attest to the data model accuracy in and between all systems as a result of TSP and Resource Entity data passing the ERCOT validation rules. | * + **Contingencies that do not consider re-closers**   **Known impacted contingencies have been sent to TSPs to confirm contingency definition. Target date for resolution = 10-15-10**   * + **MMS CIM importer issue with contingencies with series devices.**   **This impacted 121 of 2500 contingencies. They were manually fixed within 2 days. Long term fix from vendor, but manual workaround in place.**   * + **Consideration of Phase Shifter Transformers in DAM and RUC**   **Phase Shifting Transformers have limitation of 1 setting per day. Shortly after the start of the 168 hour test a manual workaround was put in place for testing to set “monitor-only” impacted equipment to limit constraint impacts.**  **Binding constraints on Generation Step Up transformers are under review.** |
| Execute DAM, DRUC, HRUC and WRUC for 7 days within timelines set by Nodal Protocols. If any activities fall outside of expected timelines, procedures for handling such incident must be executed by ERCOT personnel in adherence with Nodal Protocols and internal ERCOT procedures. | **All DAM publishing were within Protocol timelines except for one which was 8 minutes late. The one that was late was due to MMS server issues (see issues review sections in this document). All DRUC executions were completed on time. WRUC was run several times but for a study period less than 7 days (due to COP issues). HRUC performance at times had issues. These issues included low quality COP issues. Additionally there were issues with MMS Server that impacted HRUC completion times.** |
| Verify RT Operators can maintain system frequency to scheduled frequency, maintain ancillary obligations and resolve constraints during the period in which ERCOT will be performing Full System Market and Reliability tests during the 168-Hour Test. | **NERC standards were exceeded and ERCOT expectations were met.** |
| Validate ERCOT can effectively and accurately manage all constraints in both DAM and RT (i.e. not constrain on invalid contingencies or inaccurate line ratings) and system will utilize full list of competitive constraints. | **Per protocols, the zonal CSCs and CREs were used as the competitive constraints and posted.** **There were no inaccurate line ratings discovered during the test. In DAM, 121 contingencies were removed as discussed above.** |
| Validate that ERCOT can execute and manage all SPS, RAPs, PCAPs, MPs, and TOAPs to control congestion in the DAM, DRUC, HRUC, and RT as appropriate. | **During the 168 hour test the generic constraint studies did not predict activation of PCAPs MPs and TOAPs. ERCOT is reviewing its procedures to determine why the PCAPs which appeared in RT were not predicted two days ahead.** |
| Validate that ERCOT is accurately reflecting all congestion mitigation measures (SPS, RAPs) in DAM. | **SPS’s and RAPs were properly modeled and managed.** |
| The rolling CPS1 one minute average score must equal or exceed 100% during the Full System Market and Reliability test period. The target minimum is 125.  Note that the CPS1 average will not take into account the two one-hour periods when ERCOT is transitioning to Nodal and then back to Zonal and any periods in which ERCOT must deploy RRS in response to system contingencies. | **The hourly averaged CPS1 score ranged from 103 to 193. The average for all hours with Resources on full Nodal control was 156.** |
| Zonal Commercially Significant Constraints (CSCs) and Closely Related Elements (CREs). managed below thermal limits. | **All were managed below thermal limits.** |
| Local Congestion managed below thermal limits. | **ERCOT manages congestion dispatching generation to resolve post contingency overloads, i.e. remain N-1 secure. ERCOT does not remain under N-1 flow limits 100% of the time. During the 48 hour LFC test ERCOT managed 17 unique contingency-overload constraints. During the 48 hour LFC test ERCOT managed congestion below thermal limits with the exception of one period during which one constraint remained over its post-contingency flow limit due to insufficient generation dispatch room. This occurred over peak hours and remained until a forced outage was restored.** |
| Stability limits managed below transfer limits. | **Yes.** |
| No NERC Disturbance Control Standard (DCS) failure if applicable. | **There were no NERC DCS failures.** |
| No LFC-SCED system issues that result in termination of the test. | **There were no LFC-SCED system issues that terminated the test.** |
| The 168-Hour test will provide adequate data to set the GREDP/CLREDP performance. criteria variables X, Y, and Z. ERCOT shall produce appropriate reports that can be used to set these variables. | **ERCOT is in the process of preparing this analysis and plans to provide the information at the October TAC meeting.** |
| Bilateral trades are processed and flow through the market systems with results returned to MPS. | **No issues have been reported.** |
| Outputs from the Day Ahead Market, Reliability Unit Commitment, and Real Time Market can be reasonably explained based on the inputs. | **Yes with the exception of the RUC handling of minimum energy and minimum start-up cost in the Three Part Supply Offer. This issue is being treated as an emergency patch to be available by the 36-hour test.** |

**IX. Readiness Criteria Dashboard**



**Appendix A. Nodal Protocol Risk Assessment**

ERCOT’s Nodal Protocol Risk Assessment concludes that there is only one risk that must be mitigated for Go-Live.

The Nodal Project Team identified the need to verify the reconciliation of the Nodal Protocol requirements, the ERCOT Nodal Systems and Market Expectations based on the experiences of other ISOs in deploying nodal markets. This experience has shown that the expectations of market participants are often missed, despite the best efforts at creating defining tariffs or protocol requirements. The reconciliation effort involved two primary projects:

1. the Protocol Traceability Effort (the PTE);and,
2. an independent broad, high-level review and analysis of the Nodal Protocols to:

* Assess if the Nodal Protocols will deliver the intended improvements envisioned over the existing Zonal Market;
* Assess potential nodal market design weaknesses; and,
* Describe and suggest priority market structure issues for further analysis.

The Protocol Traceability Effort (PTE) identified and traced individual Protocol requirements to the specific Functional System Requirement, system design and other support documents. The PTE activities completed in the 1st quarter 2010 and concluded that system functional requirements substantially met the Nodal Protocols.

The PTE also identified Protocol requirements that are met by ERCOT administrative processes and procedures, including the management of reports and market information postings for the use of the Market Participants.

A number of Alignment Items were identified, reviewed with the Market, and a remediation plan established.

The independent broad, high-level risk review and analysis was completed in August 2010. The review’s overall assessment of the Nodal Protocols confirmed for the Nodal Project Team that the Protocols when implemented are likely to improve market performance in the intended areas compared to the existing Zonal Market. The assessment also confirmed that:

* Nothing was found to suggest the existence of large-scale gaming or market manipulation opportunities;
* One potential show stopper issue must be addressed before market start; and,
* There are several issues that could cause problems and create risks until they are fixed **but** **do not** threaten the Nodal Market start or viability in the near term.

The single issue which the assessment identified as requiring resolution before market start relates to the ability of a Non-Opt in Entity (NOIE) to offer certain Point-to-Point Options, that the NOIE owns, for sale in the DAM and, if un-sold, subsequently carry the PTP Option to the Real Time Market. This issue merited immediate resolution because, depending on the number of source/sink pairs associated with the options that are to be carried to Real Time, the DAM optimization engine is at risk of not being able to solve within its allotted portion of the Day-Ahead Market execution timeline. This is a performance issue rather than a failure of the ERCOT implementation to meet Protocol requirements.

ERCOT’s immediate focus is the resolution of this single issue to support the start of the Nodal Market. Beyond this immediate need, ERCOT will provide the Board in the near future it’s plans to address and resolve the remaining findings produced by this assessment.

|  |  |  |  |
| --- | --- | --- | --- |
| **Risk Category** | **Finding** | **Resolution Next Steps** | **Status** |
| CAT1 | NOIE P2P Options performance issue | 1. PTP options testing in Trials 2. PTP Options Survey 3. Evaluate reducing DAM contingency list 4. Upgrade Hardware | 1. COMPLETE 2. COMPLETE 3. IN PROCESS 4. IN PROCESS |

**Appendix B. Remaining Activities & Issues**

***This section covers a summary of items from the All Nodal Issues*** version ***“All Issues: 10/01/2010”*** available on the ERCOT Readiness Website under the Documents Tab > Nodal Program Office > All Issues section <http://nodal.ercot.com/docs/po/index.html>.

**Nodal Issues Resolution Processes**

ERCOT is committed to working with Market Participants and key stakeholders to ensure all known issues are considered for Go-Live impacts. A number of forums and tracking tools are in place to manage the issues and ultimately for ERCOT to provide a Go-Live recommendation for TAC and the ERCOT Board to consider. For the ERCOT certification signoff this section documents the current status of the issue and the ERCOT position with regards to remaining activities and Impact for Go-Live.

On a weekly basis, the ERCOT team will continue to track critical milestones and status that will be provided to the Board of Directors. If ERCOT Management and/or the Board of Directors determines that there are significant issues that could jeopardize Go-Live or impact the December 1, 2010 Go-Live date, they may decide to re-assess the readiness declaration.

**Nodal Program Risks and Issues**

ERCOT continues to manage and monitor the following Risks / Issues to ensure that there are no impacts to Nodal Go-Live. At the time of signoff, all three of these issues have a Mitigation Plan that will continue to be managed.

|  |  |
| --- | --- |
| **Risk / Issue Description** | **Priority** |
| Network Model Management | Med |
| Market Design Assessment | Med |
| Operational Readiness | Med |

**Nodal Parking Deck**

The Parking Deck is a collection of system changes that will be considered for delivery after Nodal go-live. Many of the items are Board-approved NPRRs, SCRs, and NOGRRs. Others are enhancements that were set aside over the course of the Nodal project in order to avoid impacting the delivery schedule. In 2011, the Parking Deck items will be assessed for impact and feasibility for delivery in Nodal stabilization or a future Nodal release. The placement of these items in the overall release plan will be reviewed in the stakeholder process and presented to the Board for approval.

As of September 2010, the Parking Deck contains 16 Board-approved changes, 7 items that are in-flight in the stakeholder process, and 17 other items for future consideration.

**Market Participant Issue List Status**

ERCOT continues to work with Market Participants to review and identify a resolution plan for known issues tracked through the TSP, QSE, or DAM Deep Dive discussions. The summary below outlines the current ERCOT position on these issues from an impact to Go-Live. The detailed lists of these items are available in the ***All Nodal Issues*** document located at: <http://nodal.ercot.com/docs/po/index.html>.

|  |  |  |
| --- | --- | --- |
| **Category** | **TSP**  **Issues** | **QSE Issues** |
| Open – Critical for Go-Live | 0 | 1 |
| Open – Not Critical (to be delivered for Go-Live) | 0 | 14 |
| Open – NPRR in process (potential system impact) | 1 | 4 |
| Open – NPRR in process (no system impact) | 0 | 0 |
| Open – Future System Change Requested (post Go-Live) | 32 | 5 |
| Closed – Item resolved or monitoring | 19 | 34 |
| **Total** | **52** | **58** |

**Appendix C. Nodal Program Gantt and Dashboard**

