



# Nodal Program Update

Mike Cleary

Sr. VP and Chief Technology Officer

ERCOT Board of Directors

18 May 2010

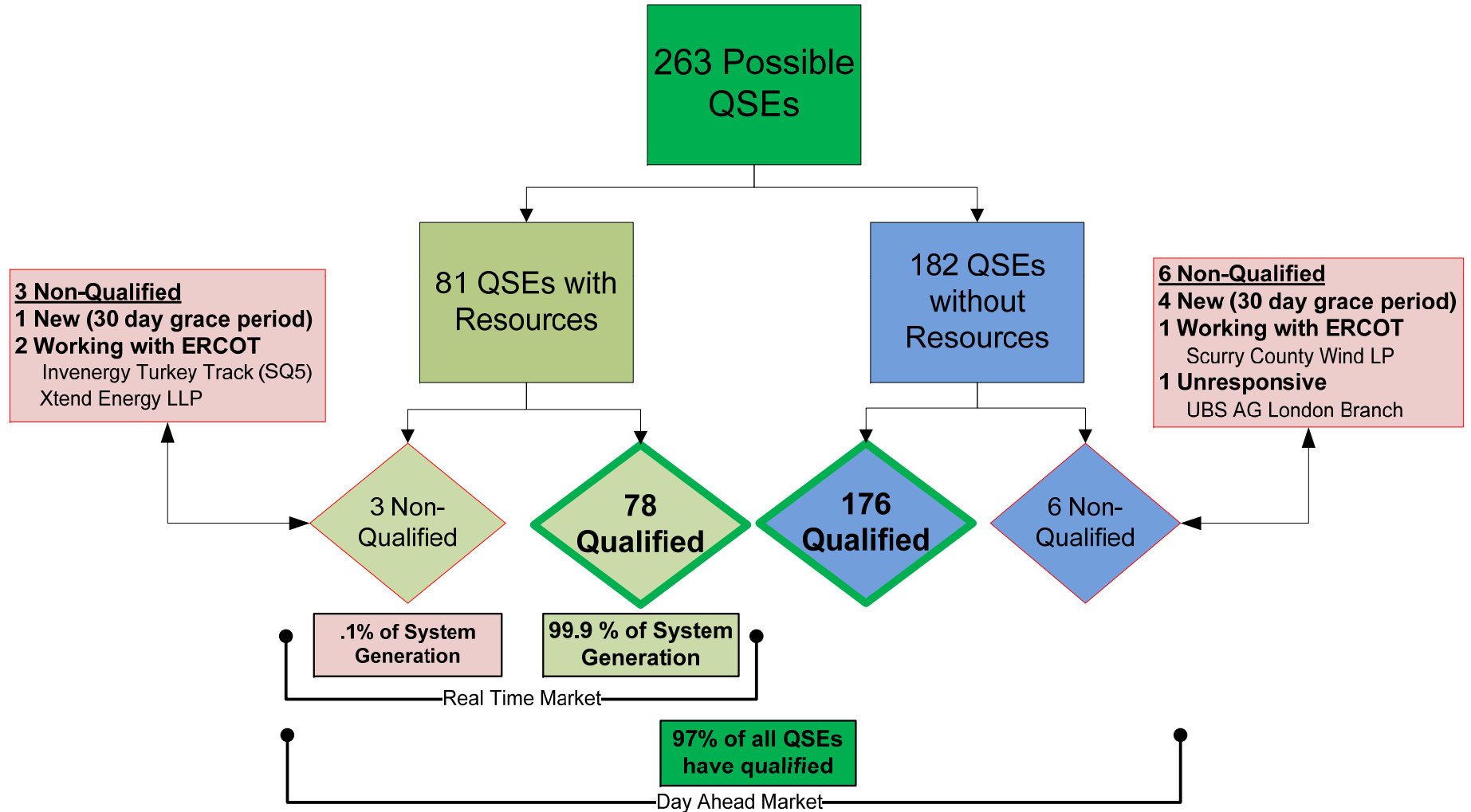
# Agenda

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- **Program Status**
- **Market Readiness**
- **Financials**
- **Appendix**

# 196 Days to Go-Live

## Phase 5: Full Functionality 0 Items Impacting Go-Live Date



# 196 Days to Go-Live

## Phase 5: Full Functionality Market Quality Testing and Operational Readiness

### Achievements within Market Trials:

- Market Trials has been running for 13 weeks
- Phase 2.1: Market Connectivity
  - Real Time / Day Ahead
- Qualifications
  - 97% of the QSEs have qualified
  - 99% of network model has been validated
- CRR
  - Three monthly CRR auctions have been run and invoiced
- Phase 3.0: Real Time Markets
  - Six month LMP analysis started on March 1<sup>st</sup>
  - The \$2,250 cap on prices has only been reached a few times since 03/04/10
- Phase 4.0: DAM / RUC
  - Nine DAM runs have been completed
  - Running twice a week
  - DRUC
  - DAM / Real Time Settlement
  - Strong participation from the Market Participants (191 QSEs on Thursday April 29<sup>th</sup> )

### Upcoming Milestones for Market Trials:

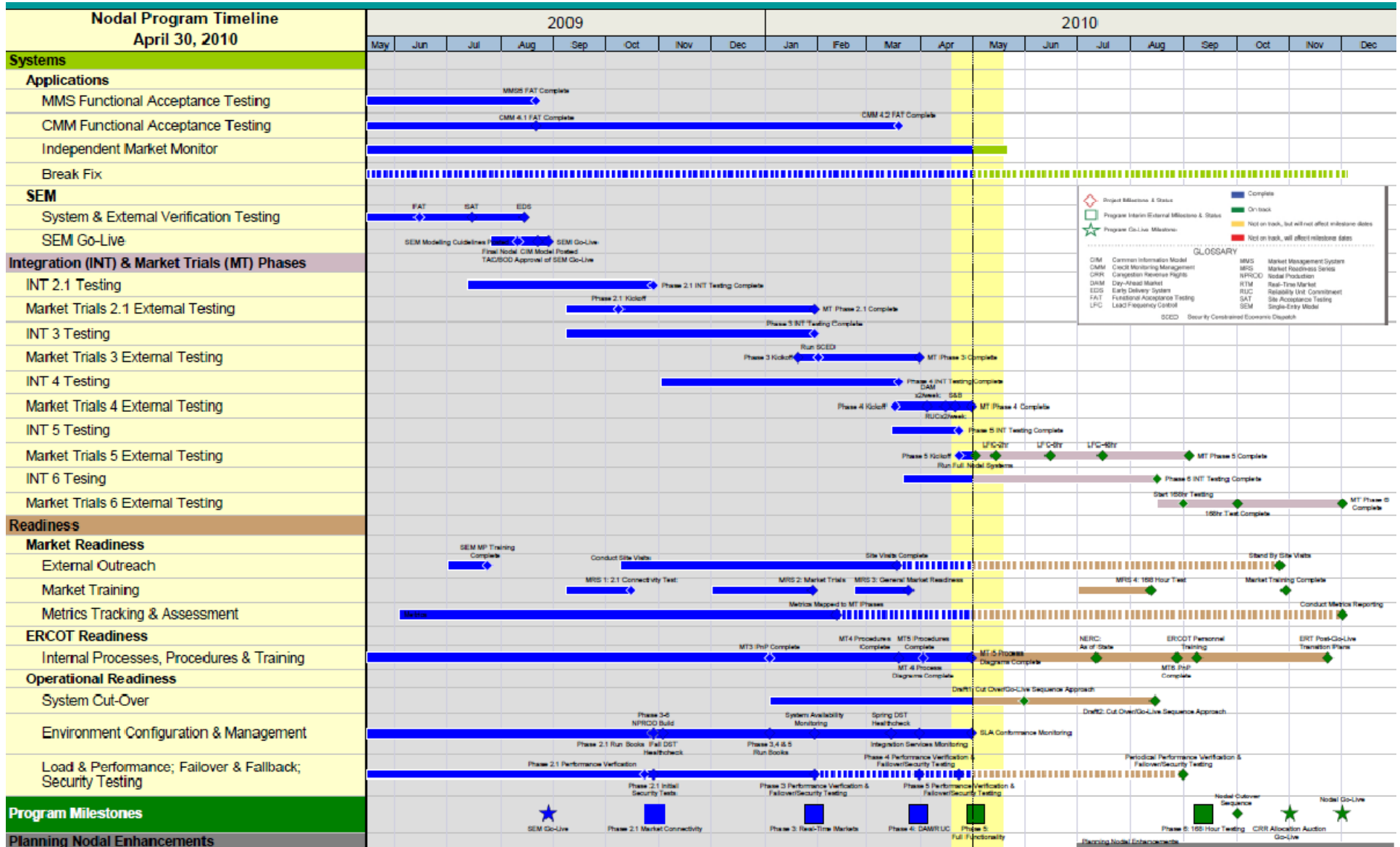
- Reporting support for DAM/RUC/SAS
- CMM Module
- DAM / RUC 3x/wk
- DAM / RUC 5x/wk
- Closed Loop LFC
- Phase 5: Full Functionality
- 168 HR Test
- System Cut-Over

# Nodal Internal/External and Vendor Headcount 2010

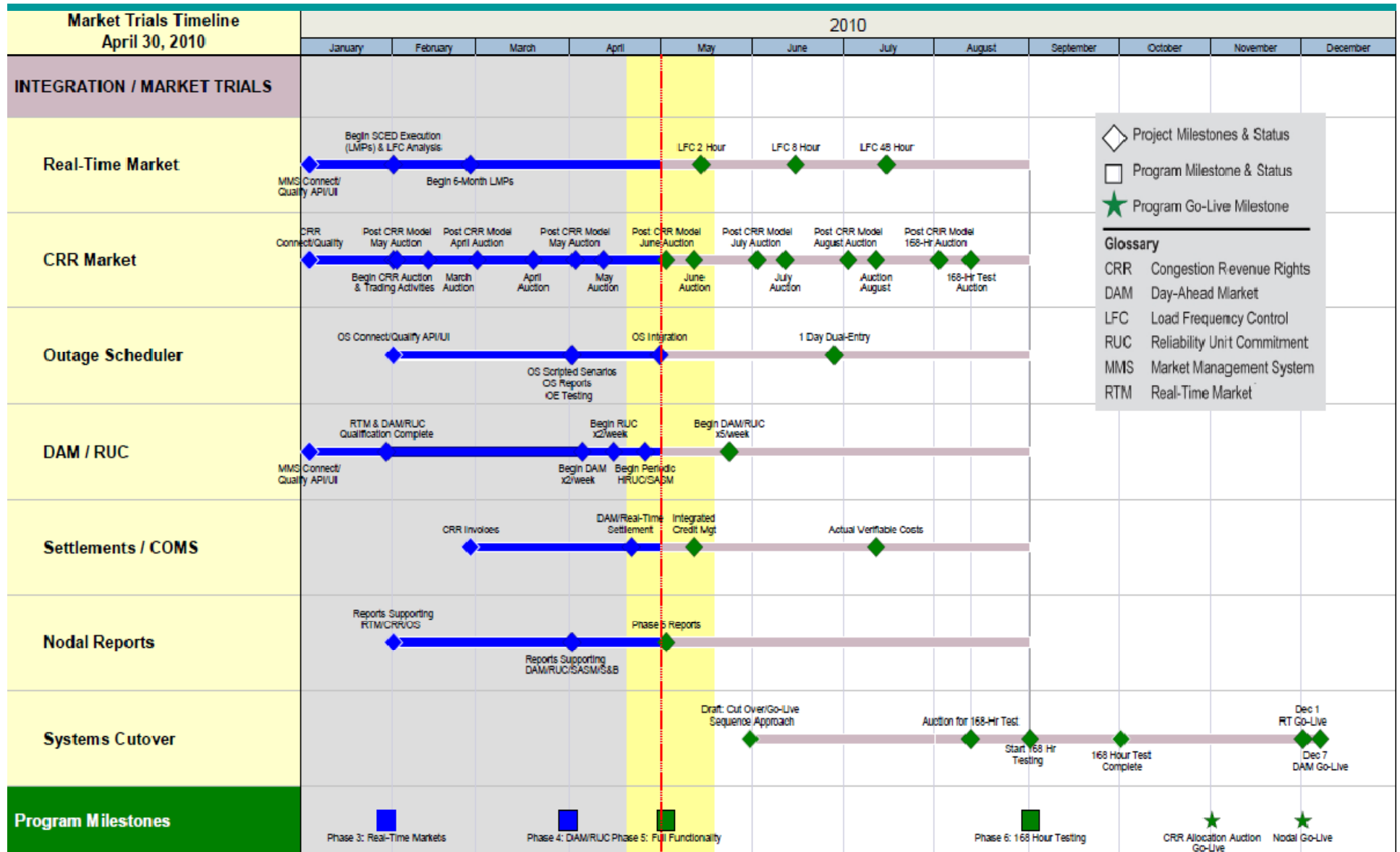
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**To be provided before Board of Directors meeting**

# Integrated Nodal Timeline – Go-Live December 1<sup>st</sup>, 2010



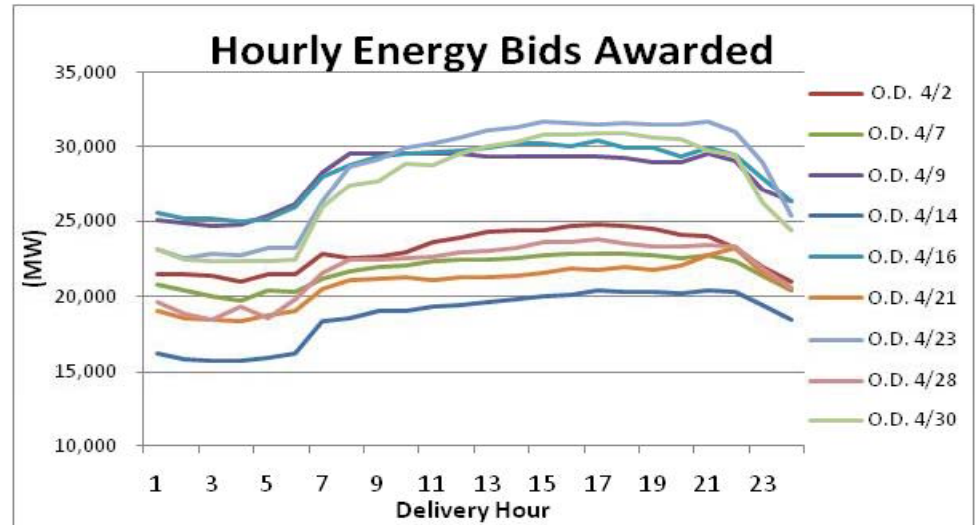
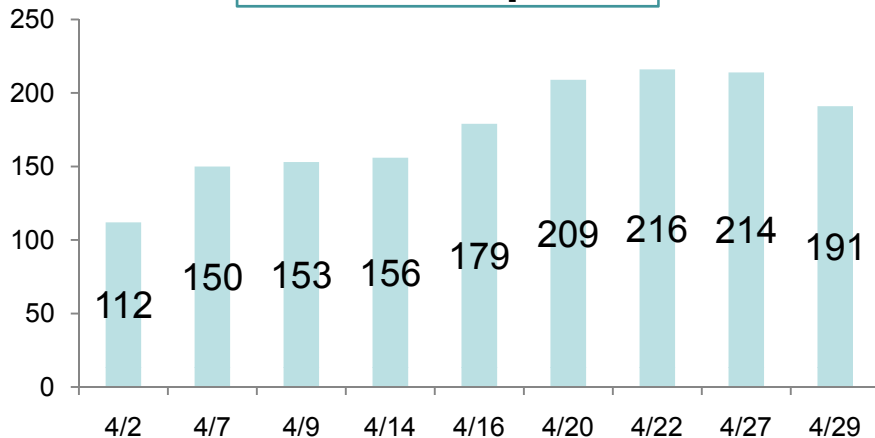
# 2010 Market Trials Timeline - Go-Live December 1<sup>st</sup>, 2010



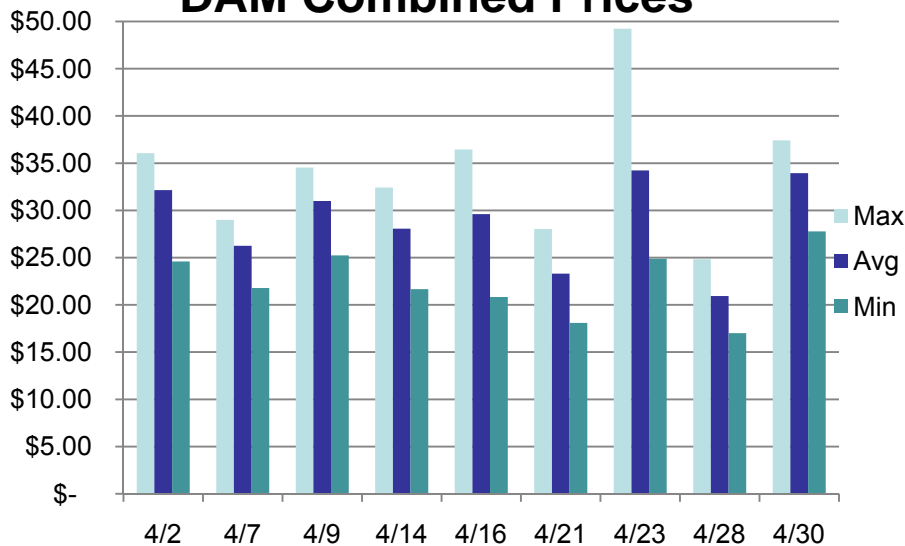
# 196 Days to Go-Live

## DAM Summary

### QSE Participation



### DAM Combined Prices

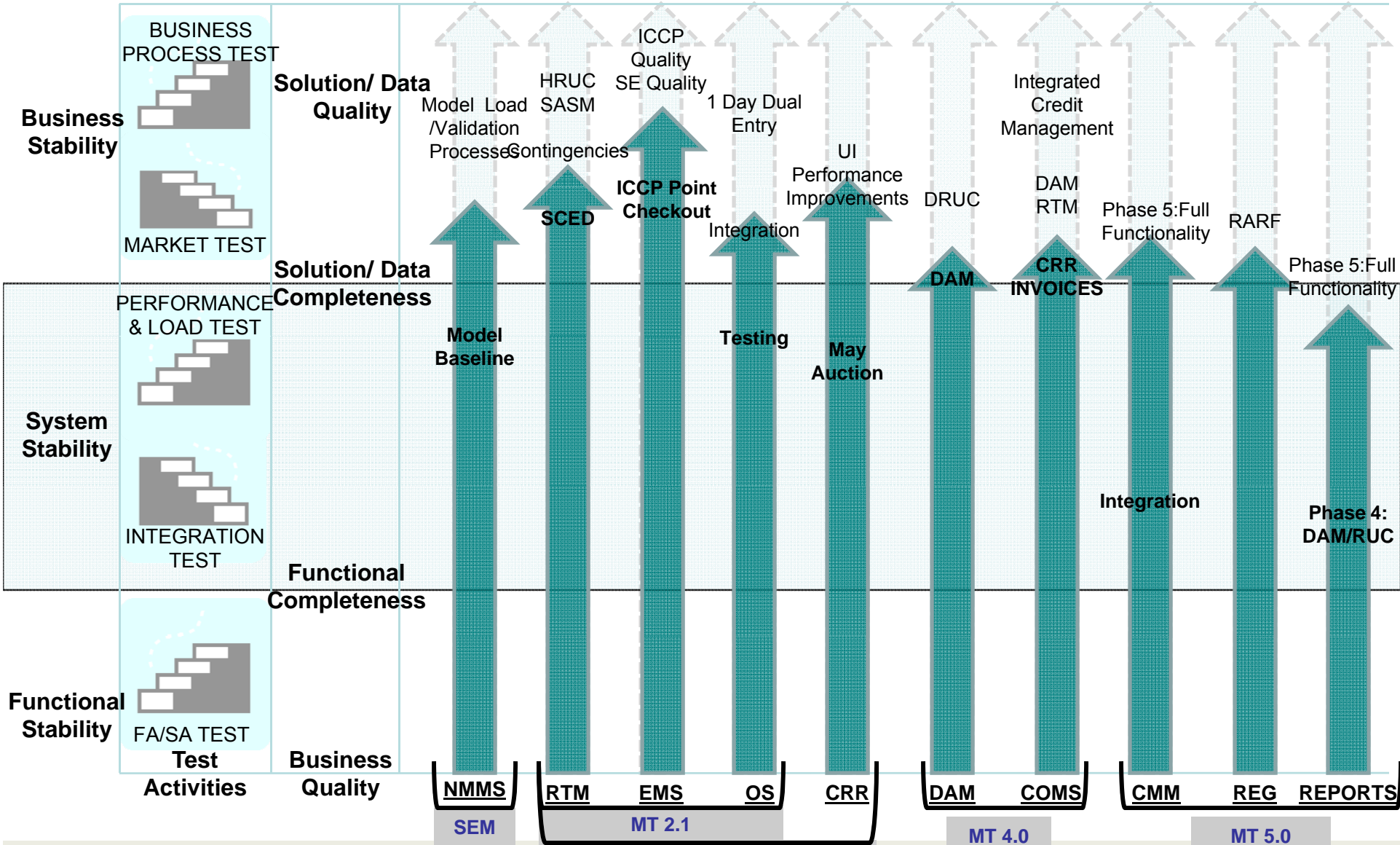


### Issues with DAM:

- Intermittent issues with CRR performance and availability since Monday, May 3<sup>rd</sup>
- Correcting Market Bid/Offer IDs with special characters (4/29)
- The AS Awards file had an issue with publishing after DAM. (4/27)
- Encountered a known issue where MMS cannot handle multiple Load Resources mapped to a single Load point in the model (4/13, 4/15)



# Go-Live



# Nodal Program Risks & Issues

Risk/Issue	Impacted Milestone	Target	Category	Probability	Severity	Status
<p><b>Market Interaction Operating Level Agreements (OLAs)</b>  <i>Need to determine operating level agreements associated with market interactions to assist ERCOT in establishing operational thresholds:</i></p> <ul style="list-style-type: none"> <li>-Network Model Management</li> <li>-CRR sizing</li> <li>-Reporting</li> </ul>	Program	April/ May 2010	Scope / Budget	High	Low	<ul style="list-style-type: none"> <li>• Phase 4 OLA definitions complete</li> <li>• Phase 5 OLA definitions drafted, pending approval</li> <li>• Regular updates to NATF and NDSWG</li> <li>• 200,000 submissions total; Remanded to 5/19 WMS</li> <li>• Reports continue to become available as Market Trials activities ramp-up. Performance monitoring continues</li> </ul>
<p><b>Market Design Assessment</b>  <i>Risk around the protocol traceability project and the market results as each phase of market trials becomes active.</i></p>	Program	August 2010	Scope / Budget	Low	High	<ul style="list-style-type: none"> <li>• Building experienced market design team to review and assess design and protocol alignment with market trials results</li> </ul>

# Earned Value for the Nodal Program

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**To be provided before Board of Directors meeting**

# Participant Readiness Touch Points

2010				
	May	June	July	August
<b>Meetings</b>	<ul style="list-style-type: none"> <li>• NATF 5/4</li> </ul>	<ul style="list-style-type: none"> <li>• NATF 6/1 and 6/29</li> </ul>	<ul style="list-style-type: none"> <li>• TBD</li> </ul>	<ul style="list-style-type: none"> <li>• NATF 8/3 and 8/31</li> </ul>
<b>Training</b>	<ul style="list-style-type: none"> <li>• Nodal 101</li> <li>• Transmission 101</li> <li>• Generation 101, 201</li> <li>• CRR – instructor-led</li> <li>• NMMS</li> <li>• Economics of LMP</li> <li>• NOIE QSE Operations</li> </ul>	<ul style="list-style-type: none"> <li>• Nodal 101</li> <li>• LSE 201</li> <li>• Generation 101, 201</li> <li>• Economics of LMP</li> <li>• CC Workshop</li> <li>• VC Workshop</li> <li>• AS Workshop</li> <li>• Retail Workshop</li> </ul>	<ul style="list-style-type: none"> <li>• Nodal 101</li> <li>• Transmission 101</li> <li>• Generation 101, 201</li> <li>• Basic Training Program</li> <li>• NOIE QSE Operations</li> <li>• Settlements 301</li> </ul>	<ul style="list-style-type: none"> <li>• Nodal 101</li> <li>• Transmission 101</li> <li>• Generation 101, 201</li> <li>• Basic Training Program</li> <li>• NOIE QSE Operations</li> <li>• Settlements 301</li> </ul>
<b>Outreach</b>	<ul style="list-style-type: none"> <li>• Standby site visits</li> <li>• Metrics monitoring</li> <li>• Bi-weekly TSP calls</li> <li>• MRS #4 Cutover</li> </ul>	<ul style="list-style-type: none"> <li>• TSP Outage Scheduler Road Show begins</li> <li>• Phase 5 Metrics launch</li> </ul>	<ul style="list-style-type: none"> <li>• Qualification assessment (MP17)</li> <li>• Standby site visits</li> </ul>	<ul style="list-style-type: none"> <li>• Standby site visits</li> </ul>
<b>Market trials</b>	<ul style="list-style-type: none"> <li>• Weekly Trials calls</li> <li>• 2 hr system-wide LFC test</li> <li>• Phase 5 Market Trials initiates</li> </ul>	<ul style="list-style-type: none"> <li>• Weekly Trials calls</li> <li>• 8 hr system-wide LFC test</li> <li>• Full market trials functionality continues</li> </ul>	<ul style="list-style-type: none"> <li>• Weekly Trials calls</li> <li>• 48 hr system-wide LFC test</li> <li>• Verifiable costs in execution</li> <li>• NPRR206 in execution</li> </ul>	<ul style="list-style-type: none"> <li>• Weekly Trials calls</li> <li>• Prepare for 168 hr test</li> </ul>

## Next 60-days of Workshops

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Course	Start Date	Location
Transmission 101	May 18	CPS Energy (San Antonio)
Network Model Management	May 20	CPS Energy (San Antonio)
Basic Training Program	May 24	Energy Plaza (Dallas)
NOIE QSE Operations	May 24	Austin Energy Town Lake Center (Austin)
MRS #4 Cutover	May 25	Hilton – Austin Airport (Austin)
Generation 201	May 26	TXU (Dallas)
Transmission 101	June 1	ERCOT Met Center (Austin)
Combined Cycle Workshop	June 2	Suez Energy (Houston)

Enrollment at: <http://nodal.ercot.com/training/courses/index.html>

## Next 60-days of Workshops (continued)

<b>Course</b>	<b>Start Date</b>	<b>Location</b>
Verifiable Cost Workshop	June 3	Suez Energy (Houston)
Generation 101	June 8	LCRA (Austin)
Market Settlements 301	June 9	Suez Energy (Houston)
Generation 201	June 17	LCRA (Austin)
Basic Training Program	June 21	ERCOT Met Center (Austin)
Load Serving Entity 201	June 23	Austin Energy Town Lake Center (Austin)
ERCOT 101 for Wind Generation	June 28	ERCOT Met Center (Austin)
Transmission 101	June 29	Energy Plaza (Dallas)
Transmission 101	July 13	CenterPoint Energy (Houston)

Enrollment at: <http://nodal.ercot.com/training/courses/index.html>

# CRR Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP15(B) CRR Connectivity Qualification	Green	CRRAHs	Even weighting	<b>Active Phase 3 Metric</b>			4.3%	Successful submission CRR transactions	64/70 CRRAHs qualified.
CRR3 Operation of CRR Auctions and Allocations	Green	CRRAHs	Even weighting	93.8%	0%	0%	6.2%	Participation in at least one of the last two auctions or allocations. AMBER/RED scores light up 5/5/2010.	60/64 CRRAHs with adequate participation in May or Balance of Year auction or allocation
<b>ERCOT Metrics</b>									
CRR3 Operation of CRR Auctions and Allocations	Amber	ERCOT	N/A	N/A	N/A	N/A	N/A	Auction results distributed to participants per schedule in CRR Handbook	5/2 "2010 Balance of year auction results" moved to 5/5 due to Nexant resources onsite.
	5/6/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	Allocated Revenue Rights in statistical sample = 100% accurate	Results of Source/Sink prices / CRR Clearing prices report (avail 5/6)
CO8 Verify CRR Auction Invoices	Green	ERCOT	N/A	N/A	N/A	N/A	N/A	CRR Auction Result for MP(n) – CRR Auction Invoices for MP(n) = 0\$	S&B validated that auction invoices reflected awards per CRRAH for March, April, and May auctions, .
	Green	ERCOT	N/A	100%	0%	0%	0%	System Generated CRR Auction Invoices not posted = 0	March 2010 Monthly = 40 of 40 April 2010 Monthly = 38 of 38 May 2010 Monthly = 48 of 48

**Notes:**

1. Added CRR3 participation threshold (market segment) - >= 80% participation (GREEN), >= 50% and < 80% (AMBER), < 50% (RED)



# Real-Time Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP3 Market Submissions Connectivity Qualification	Green	QSERs	Generation Ratio Share	99.0%	1.0%	0.0%	0.0%	Successful submission of RT and DAM transactions	81/84 QSERS Qualified (includes QSEs with Load Resources).
MP15-A Real-time Market Participation	Green	QSEs	Even weighting	99.0%	1.0%	0.0%	2.2%		176/182 QSEs qualified. Below 95% threshold for overall GREEN.
<b>Active Phase 3 and 4 Metrics</b>									
EMO6 Individual LFC Testing	Green	QSERs	Generation Ratio Share	91%	0%	0%	9%	80% of system-wide generation has completed individual QSE tests for LFC	56/76 QSERs completed their individual LFC test
<b>ERCOT Metrics</b>									
MO4 Verify SCED Execution Quality	Green	ERCOT	N/A	100%	0%	0%	0%	All successful SCED executions passed the post-execution price validations.	4/6-4/19 period - 4,030 Price Validation runs with no rule violations
MO5 Generate 6 Months of LMPs	Green	ERCOT	N/A	98.1%	0%	1.9%	0%	95% of SCED executions completed with LMPs posted on MIS.	4/6-4/19 period, 3,985 out of 4,063 SCED runs with LMPs posted.

**Notes:**

1. ERCOT Criteria added to MP3 and MP15(B) – “ERCOT scores in connectivity will mirror the MP scores.”



# Day-Ahead Market Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP16 DAM Participation	Green	QSERS	Generation Ratio Share	98.9%	0.0%	1.1%	0%	Participation in 50% of the Day-Ahead Market runs	76/79 Rolling Average QSEs with Resources, 70/79 Regular
	Amber	QSEs	Even Weighting	79.1%	6.0%	12.1%	2.8%		144/182 Rolling Average QSEs w/o Resources
<b>ERCOT Metrics</b>									
MO8 Verify DAM Execution Quality	5/19/2010	ERCOT	N/A	N/A	N/A	N/A		DAM executions pass the post-execution price validations	Report in progress
MO9 Generate DAM LMPs	5/19/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	95 percent Day-Ahead Market execution as evidenced by Day-Ahead LMP postings	Report in progress
MO10 DRUC Execution	6/2/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	95 percent DRUC execution	Report in progress

Notes:

1. MP16 – 10 DAM runs (as of the 5/4/2010 run)
2. MP16 – Metric is based on a 2 week rolling average.
3. MP16 – 96.5% Load participating.

# Outage Scheduler Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP20 Outage Scheduler Connectivity Qualification	Green	QSERS	Generation Ratio Share	98.1%	0.0%	0.0%	1.9%	Successful submission of OS transactions	74/78 QSERS qualified.
	Green	TSPs	Ownership Ratio Share	99.8%	0%	0%	.02%		23/25 TSPs qualified.
<b>ERCOT Metrics</b>									
EMO3 Verify Outage Evaluation System Functionality	6/2/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	A test of the Outage Management Process is completed	Will be reviewed at 6/1 NATF

# Network Modeling Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP14-C TSP Model Validation	Green	TSPs	Ownership Ratio Share	<b>Active 4 Metric</b> 99.9% .1% 0.0% 0.0%				Network Model data validated by TSP	24/28 TSPs have submitted model validation e-mail to ERCOT.
MP6 Telemetry Compliance with Nodal Protocols 3.10.7.5	Green	QSERS	Generation Ratio Share	100%	0.0%	0.0%	0.0%	Expected State Estimator telemetry submitted.	78/78 complete. 3502 total SE points provided
	Green	QSERS	Generation Ratio Share	100%	0.0%	0.0%	0.0%	Expected SCED telemetry submitted.	78/78 complete. 7629 SCED points provided
	Green	TSPs	Ownership Ratio Share	99.3%	0.0%	0.0%	.7%	Expected TSP telemetry per ICCP Handbook submitted	16/17 TSPs above 95% threshold for GREEN. 357 points outstanding
N2 Telemetry ICCP System Failover	Green/White only	QSERS	Generation Ratio Share	11.8%	0%	0%	88.2%	ICCP Failover test completed successfully prior to the 8-hour LFC test.	18/78 QSERS completed ICCP telemetry failover test
MP18 Mapping of Resources and Loads in Private Use Networks	6/2/2010	QSERS	Generation Ratio Share	N/A	N/A	N/A	N/A	# of QSE(n) PUN Points Provided / # of QSE(n) PUN Points Expected	306 points across 7 QSEs with Resources. 15 points still assigned to TDSP.
MP23 Telemetry Quality (MP to ICCP server)	7/14/2010	TSPs	Ownership Ratio Share	N/A	N/A	N/A	N/A	# of TSP(n) Suspect/Bad points provided / # of TSP(n) points total	1356 Suspect/Bad points (97.9% good quality).
	7/14/2010	QSERS	Generation Ratio Share	N/A	N/A	N/A	N/A	# of QSER(n) Suspect/Bad points provides / # of QSER(n) points total	871 Suspect/Bad points (94.9% good quality)

- Notes:
- MP6 does not include 405 QSE CB and DSC points from TSP outreach. ERCOT is determining whether these rollback into the QSER MP6 measurement



# Network Model Metrics

Metric Name0	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>ERCOT Metrics</b>									
EMO9(A) State Estimator Standards Performance	5/19/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	State Estimator converges 97% during monthly test period	March 91.4% convergence
EMO9(B) RTCA Modeling Differences	5/19/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	95% of values matched between Zonal and Nodal Network Models - Impedances - Dynamically and Non-dynamically Rated Lines - Load Tap Settings	Measurement excludes pseudo switches and multi-section lines
EMO9(C) RTCA CSC Comparison	7/14/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	CSC Pre-contingency SE Flows within 5% (Hourly snapshot)	Measurement establishes baseline flows on Commercial lines to indicate the significance of Psuedo modeling and multi-section lines on the SE flows.
EMO9(D) Validate Zonal and Nodal Security Analysis Results	9/8/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	90% of active constraints in Zonal RTCA are also detected in Nodal RTCA	To be determined
EMO10 Anomalous / Auto-Disabled Telemetered Points	6/2/2010	ERCOT	N/A	N/A	N/A	N/A	N/A	The % of Anomalous and Auto-Disabled Measurements is less than 2% of Total Measurements	April Nodal 2.58% March Nodal 3.17% Zonal hovers ~ 1.7%

Notes:

1. SE performance requirements in EMO12 moved to EMO9(A)



# Resource Entity Metrics

Metric Name	Current Score	Applies to	Weight	Green %	Yellow %	Red %	Not Scored %	Primary Criteria	Notes
<b>Market Participant Metrics</b>									
MP11 Resource Registration	Green	REs	Registered MW Capacity Ratio Share	97.7%	1.82%	.5%	0.0%	Decision Making Authority form submitted, and GENMAP validated	151/157 Resources completed.

# Readiness Metrics

Metric Name	Current Score	Applies to	Percentage (if applicable)	Primary Criteria	Notes
<b>ERCOT Metrics</b>					
E1 ERCOT Staff Completes Training	Green	ERCOT	100%	Training plans must be adhered to for highly impacted departments	15 out of 15 highly impacted departments are up to date with their training plans.
E9 Develop Nodal Procedures	Green	ERCOT	100%	Procedures developed 1 month prior and exercised in the appropriate Market Trials Phase	All MT4 and MT5 are now developed and the MT3 procedures were exercised during MT3 as scheduled. MT4 procedures on target to be exercised by the end of MT4.



# Monthly Financial Review

Don Jefferis

Interim Director - Nodal Financial Management Office

18 May 2010

# Monthly Financial Review

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**Financials to be provided before the Board of Directors meeting.**



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Questions?

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# Appendix

# Nodal Program Risks & Issues: Definitions

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## Definitions for Category, Probability and Severity of Risks & Issues:

- **Category**
  - Scope : Will require a scope change
  - Schedule: Will require a schedule change
  - Budget: Will require a budget change
- **Probability**
  - High : Probability to occur is  $\geq 90\%$ ; perceived impact would require a Change Request over the next 1-3 months
  - Medium: Probability to occur is between 31 – 89%; perceived impact would require a Change Request over the next 4 -10 months
  - Low: Probability to occur is  $\leq 30 \%$ ; not expected to require a Change Request
- **Severity**
  - High: Milestone impact, or budget impact  $> \$250,000$
  - Medium: Milestone impact - but expected to be mitigated, or budget impact between  $\$0 - \$250,000$
  - Low: No milestone impact, or no budget impact

# Defect Definitions

Severity	Definition
Severity 1: Data loss/critical error	Defects that render unavailable the critical functions of the system under test. These include errors such as system errors, application failures, loss of data, incorrect calculations, inability to transfer data, failure to access database, and inability to display information to the user.
Severity 2: Loss of functionality w/o workaround	Defects that render unavailable partial functionality of the system under test with no workaround available. These include errors such as incorrect information displayed to the user, information not updating correctly, extracts failing, and missing export files.
Severity 3: Loss of functionality with workaround	Defects that render unavailable partial functionality of the system under test with a workaround available. These include errors such as incorrect message displayed, optional information missing or not displayed correctly, not receiving e-mail notifications, and incorrect defaults.
Severity 4: Partial loss of a feature set	Defects that affect a feature that is not executed on a frequent basis and there is not a significant impact on the system. These include errors such as help information, filtering, and consistent naming.
Severity 5: Cosmetic/documentation error	Defects that are cosmetic and need to be resolved, but are not a factor in the functionality or stability of the system. These include errors such as field alignment, report formatting, drop down list order, fonts, column order and documentation that is inconsistent with the system(s) as tested.

	Prescription in Quality Center
Priority 1	Must fix ASAP
Priority 2	Must fix prior to Go-Live
Priority 3	Not critical to fix before Go-Live
Priority 4	Minor system/user impact
Priority 5	No system/user impact