Nodal Program Update

Mike Cleary

Sr. VP and Chief Technology Officer

ERCOT Board of Directors

16 February 2010

Agenda

- **Program Status**

- **Market Readiness**

- **Financials**

- **Appendix**

288 Days to Go-Live

0 Items Impacting Go-Live Date

- **Market Trials 3.0:**
  - 191 of 293 QSEs Qualified for MMS transaction submittal
    - 72 / 115 QSEs w/ Resources
 - 92.5 % of Generation Qualified
  - **Congestion Revenue Rights (CRR)**
    - 48 of 80 CRRAH Qualified to date
    - 1st Monthly Auction for March begins February 12th
      - CRR allocation starts on Feb 1st
  - **Real Time Markets / Outage Scheduler**
    - Started Feb 1st
      - Window Closes for Qualification on Aug 13th
      - Real-Time LMPs posting every 5 minutes
      - Reports available on Nodal MIS to all MPs
      - Running on CIM model NMMS/EMS/MMS
      - QSE dashboards posting Fridays to reflect submission performance (metrics Feb 11)
    - Outage Scheduler available to QSEs and TSPs
  - **March 1st starts Six month LMP analysis**
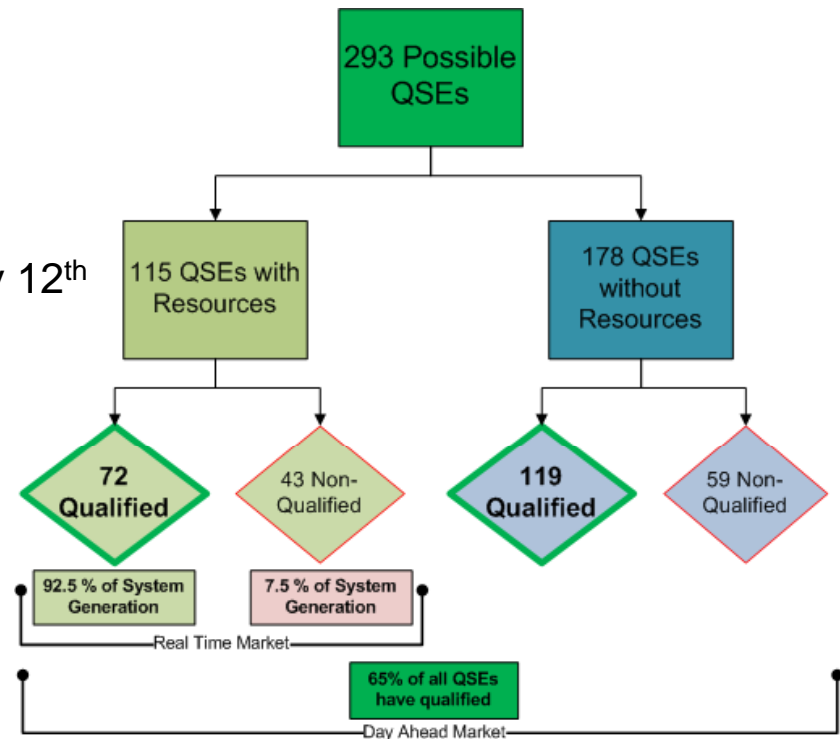
288 Days to Go-Live

0 Items Impacting Go-Live Date

- **Market Trials 4.0: DAM/RUC**
  - Starting Thursday Apr 1st, for Operating Day Friday April 2nd
    - On Schedule
      - Submission Qualifications underway in Market Trials 2.1

- **Market Trials 5.0: Full Functionality**
  - Starting May 17th
    - 2 Week Slippage
      - Mitigation plan in place to pull back on track
        » Overtime and budget monitoring

- **Market Readiness**
  - 25 of 34 outreach sessions completed
  - Market Trials Kickoff
  - Executive Briefing
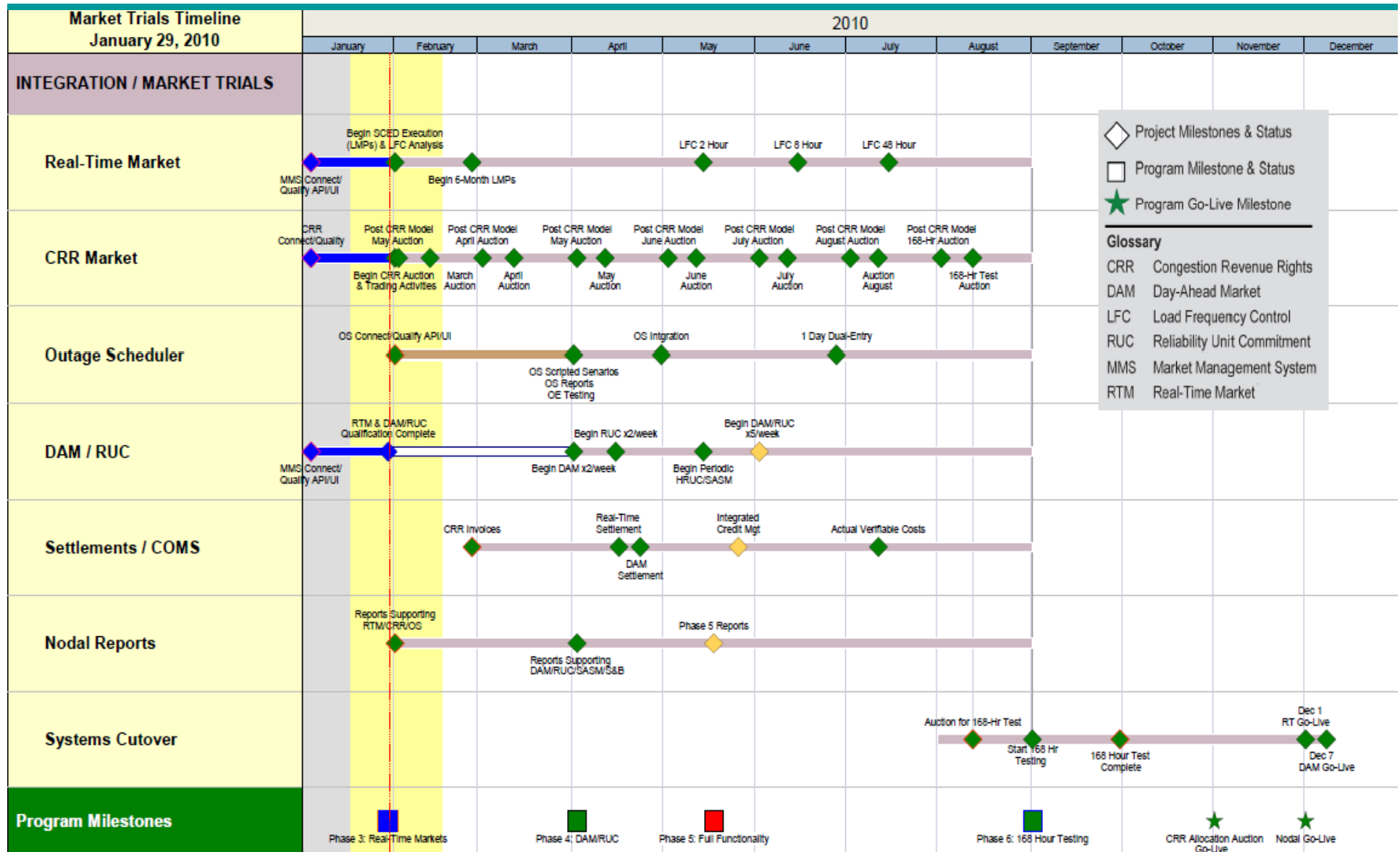

Key Takeaways from Phase 3:

- Progression from connectivity to market execution is key for Real-Time Market and CRR Auction

- Realistic RTM LMPs depend on consistent QSE resource offers across all hours of the week

- CRR Auction activities and Outage Schedule testing encouraged

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Integrated Nodal Timeline
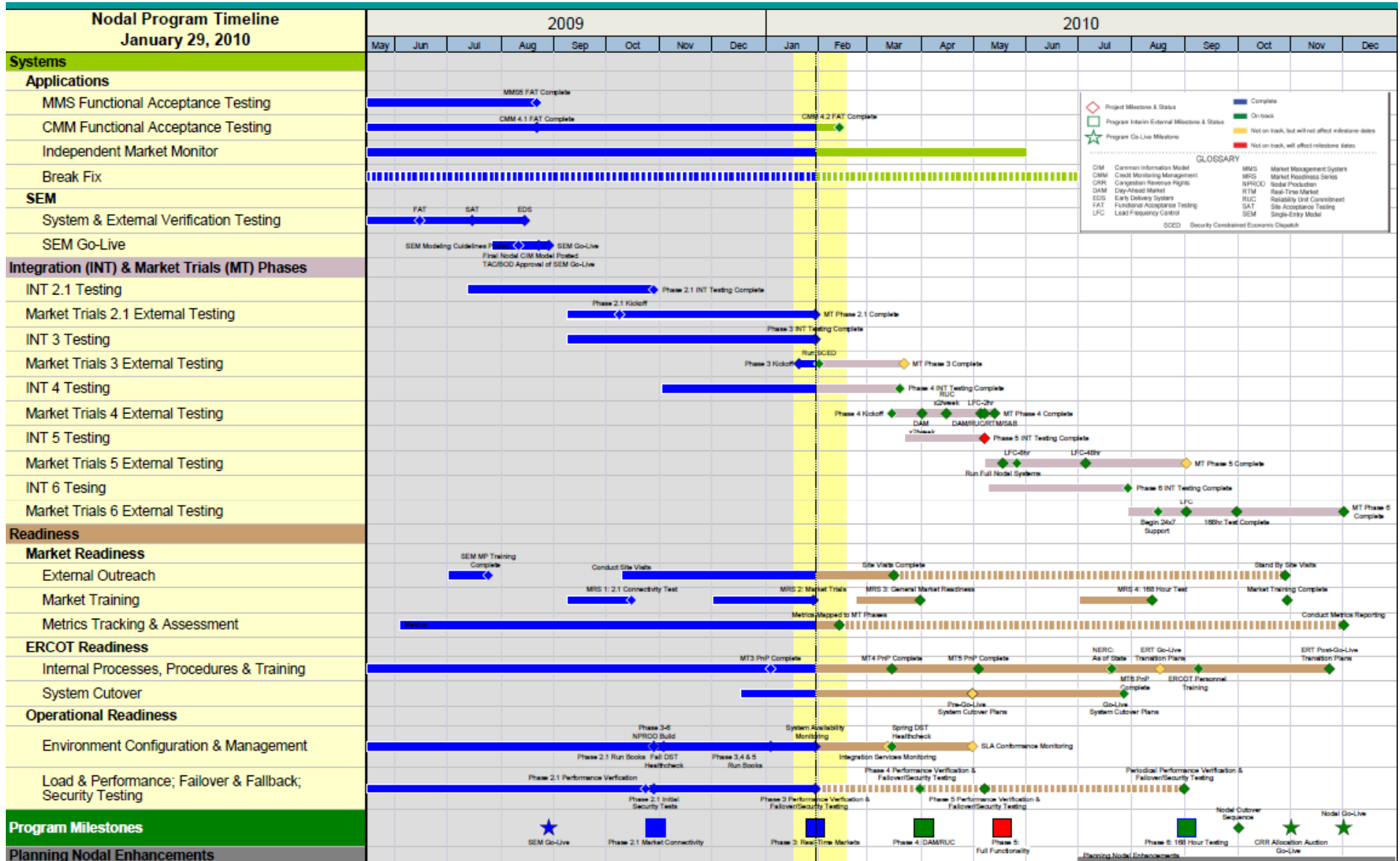
2010 Market Trials Timeline

Program Milestone Schedule Mitigation

■ Phase 5: _Full Functionality_

Integration Testing Schedule is still two weeks behind: No Impact on Go-Live
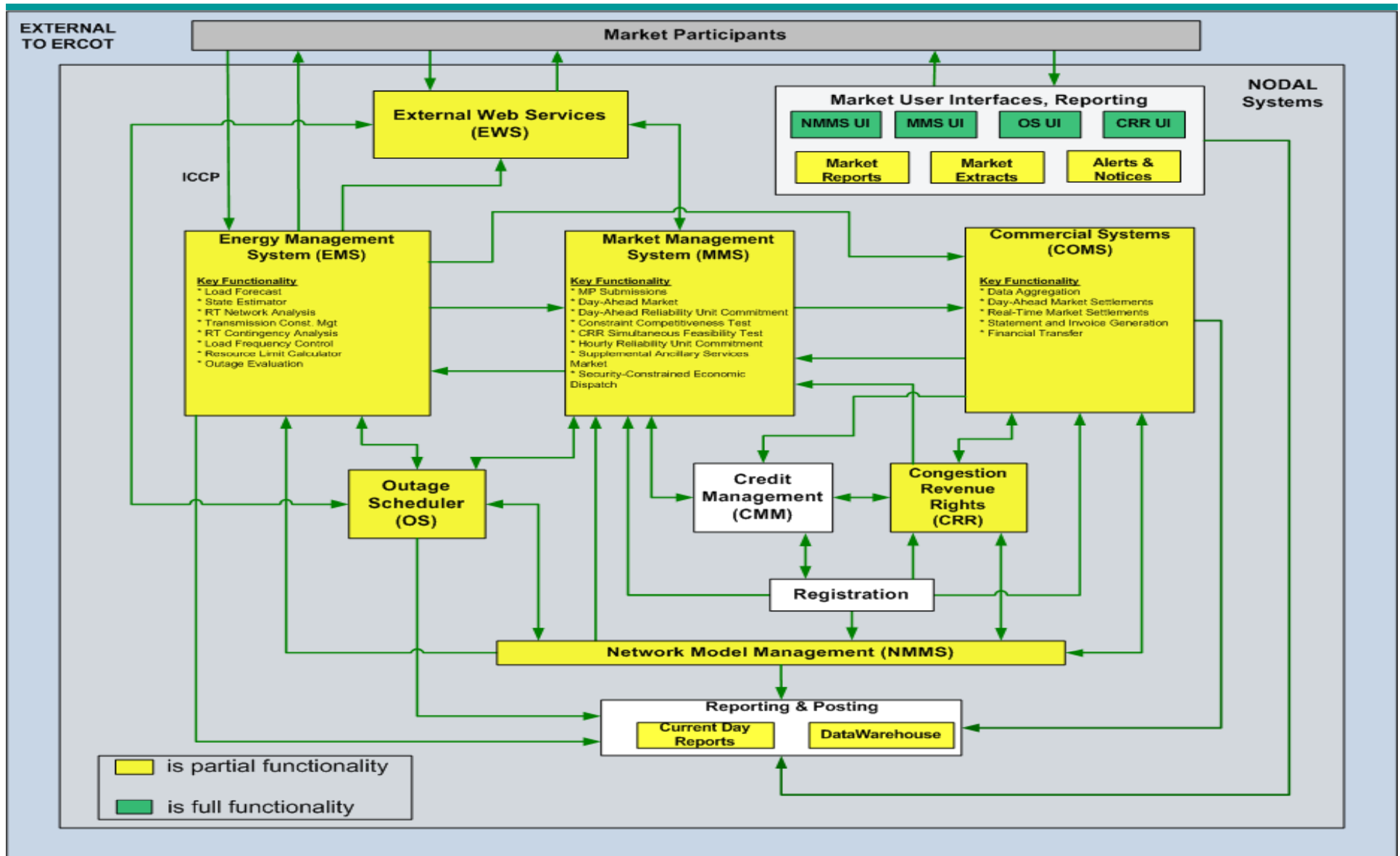
- **Scope**
  - End to end integration testing
  - Begin HRUC/SASM
  - Daylight Savings time change verification
  - Phase 5 performance verification

- **Mitigation Strategy**
  - Continue to leverage weekend overtime for Phase 5 test
  - Prioritize and phase in the delivery of reports during Market Trials
  - Prioritize Testing to ensure the critical functionality and reports are completed first
  - Prioritize must have End-to-End scenarios
  - Continue to efficiently schedule testing and release management windows

Nodal Systems Blueprint - Market Trials - Phase 3 - Feb. 1st

Nodal Program Risks & Issues: Definitions

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

- **Category**
  - <u>Scope</u> : Will require a scope change
  - <u>Schedule</u>: Will require a schedule change
  - <u>Budget</u>: Will require a budget change

- **Probability**
  - <u>High</u> : Expected to require Change Request over the next 1-3 months
  - <u>Medium</u>: Expected to require Change Request over the next 4-10 months
  - <u>Low</u>: Not expected to require a Change Request

- **Severity**
  - <u>High</u>: Milestone impact, or budget impact >$500,000
  - <u>Medium</u>: Milestone impact - but expected to be mitigated, or budget impact between $0 - $500,000
  - <u>Low</u>: No milestone impact, or no budget impact

Nodal Program Risks & Issues

Risk/Issue	Impacted Milestone	Target	Category	Probability	Severity	Status
Integration Testing - Risk *Continued risk around technology delivery of business systems integration due to complexity and continuing maturing of application and data dependencies.*	**Program**	**May 2010**	**Scope / Schedule / Budget**	**Low**	**Med**	• Phase 3 On track; planning complete, execution in progress.
Market Interaction Operating Level Agreements (OLAs) *Need to determine operating level agreements associated with market interactions to assist ERCOT in establishing operational thresholds:* *-Network Model Load Frequency* *-DAM Sizing;* *-CRR sizing* *-Reporting*	**Program**	**April/ May 2010**	**Scope / Budget**	**High**	**Low**	• On track. • Phase 3 complete. • Phase 4 and 5 OLA definitions in process. • NATF and NDSWG heavily involved in issue. Joint working session scheduled for 02/16/10 • On track; presented to NATF on 02/02/10 • On track; ERCOT is researching comparable CRR market sizes in PJM, CAISO, and MISO • On track

Nodal Program Risks & Issues

Risk/Issue	Impacted Milestone	Target	Category	Probability	Severity	Status
Reconciling Protocols, Systems and Market Expectations *Experience by other ISOs in deploying nodal markets has shown that expectations of the market participants are often missed, despite best efforts at defining tariffs or protocol requirements. ERCOT needs to assume such a risk exists for this nodal implementation as well.*	**Phase 3**	**Feb 2010** **(Change control submitted)**	**Scope / Schedule / Budget**	**Med**	**Low**	• Work underway to trace protocols, requirements and business processes alignment analyses are in progress. • SMEs added to the team in May.
Credit Management – Business & Technical Exposure *Credit Management rules and exposure calculations will change significantly with the implementation of the Nodal Program. During the requirements and design phase of the program stakeholder concerns have been expressed that may result in requested system changes as the program moves into Market Testing of Credit Management.*	**Phase 5**	**July 2010**	**Scope / Schedule / Budget**	**High**	**Med**	• ERCOT business and Nodal Program reviewing Credit concerns and next steps.

Earned Value for the Nodal Program

To be updated and provided before Board of Directors meeting.

Participant Readiness Touch Points

	2010			
	February	**March**	**April**	**May**
Meetings	• NATF 2/2, 2/16,2/19)	• NATF 3/2	• NATF 4/6	• NATF 5/4
Training	• Nodal 101 • LSE 201 • Basic Training • Generation 101, 201 • CRR – instructor-led ◆ Settlement Workshop • Operations Seminar	• Nodal 101 • LSE 201 • Basic Training • Generation 101, 201 • CRR – instructor-led ◆ Settlement Workshop • Operations Seminar	• Nodal 101 • Trans 101 • Generation 101, 201 • CRR – instructor-led • NMMS • Economics of LMP ★ Combined Cycle Workshop	• Nodal 101 • Trans 101 • Generation 101, 201 • CRR – instructor-led • NMMS • Economics of LMP
Outreach	• 5 site visits • Additional Phase 3 metrics • Standby site visits mitigation approach	• 4 site visits • Scheduled Site Visits conclude ◆ MRS #3 March 25th	• Standby site visits • Phase 4 metrics launch	• Standby site visits • Metrics monitoring
Market trials	• Weekly calls • Phase 3 Market Trials initiates • QSE OS qualification • Phase 4 Handbooks 　• *DAM/RUC* 　• *MIS*	• Weekly calls • Phase 3 Execution • Phase 4 Handbooks 　• *Updates to prior handbooks* • LFC individual QSE tests	• Weekly calls • Phase 4 Market Trials initiates • Phase 5 Handbooks 　• *Updates to prior handbooks* 　• *Credit*	• Weekly calls • 2 hr system-wide LFC test • Phase 5 Market Trials initiates

Next 60-days of Classes and Settlement Workshops

Course	Start Date	Location
Generation 201	February 9	Suez Energy (Houston)
Generation 101	February 16	Austin Airport Marriott South (Austin)
Network Model Management	February 18	ERCOT Met Center (Austin)
Settlements Workshop –RUC/RTM	February 23	ERCOT Met Center (Austin)
ERCOT Nodal 101	February 25	ERCOT Met Center (Austin)
Load Serving Entity 201	March 3	ERCOT Met Center (Austin)
Economics of LMP	March 8	Norris Conference Center (Houston)
Basic Training Program	March 8	Austin Airport Marriott South (Austin)
Congestion Revenue Rights	March 9	Norris Conference Center (Houston)
Settlements Workshop –RUC/RTM	March 9	City of Garland Fire Building (Dallas)
Settlements Workshop –RUC/RTM	March 23	Calpine (Houston)

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

Readiness Workshops

Wind Panel *Hosted by Horizon Wind* February 16, 2010 Houston, TX 9-3pm	Retail Panel *Hosted by StarTex* February 17, 2010 Houston, TX 9-3pm
• **Outreach: Program Update** • **Outreach: Real-Time Market** • **Outreach: Merged DAM&RUC** • **Credit Management** • **Wind Resource discussion**	• **Outreach: Program Update** • **Outreach: Merged DAM&RTM** • **Outreach: CRR Auction** • **Credit Management** • **Retail operations discussion**

<u>RSVP required due to room limitations, but WebEx available</u>

Wind- http://www.ercot.com/calendar/2010/02/20100216-MT

Retail- http://www.ercot.com/calendar/2010/02/20100217-MT

Market Participant Site Visits

25 Outreach Site Visits have been completed

Confirmed ☐ *Completed* ☑

Entity	Date
☑ LOWER COLORADO RIVER AUTHORITY	9-Oct
☑ CALPINE CORP	14-Oct
☑ AUSTIN ENERGY	20-Oct
☑ CITY OF GARLAND	21-Oct
☑ GDF SUEZ ENERGY MARKETING	29-Oct
☑ ANP FUNDING	3-Nov
☑ LUMINANT ENERGY	5-Nov
☑ INVENERGY WIND DEVELOPMENT	10-Nov
☑ EXELON	11-Nov
☑ AMERICAN ELECTRIC POWER SERVICE	12-Nov
☑ CONSTELLATION ENERGY	17-Nov
☑ PSEG ENERGY RESOURCES	18-Nov
☑ J ARON	19-Nov
☑ FULCRUM POWER	2-Dec
☑ EAGLE ENERGY PARTNERS I LP	3-Dec
☑ STEC	9-Dec
☑ BP ENERGY COMPANY	10-Dec

Entity	Date
☑ NRG TEXAS POWER	15-Dec
☑ DIRECT ENERGY LP	5-Jan
☑ CPS ENERGY	6-Jan
☑ BTU (Bryan Texas Utilities) SERVICES	13-Jan
☑ OCCIDENTAL	20-Jan
☑ TENASKA POWER SERVICES	26-Jan
☑ OPTIM ENERGY	27-Jan
☑ APX	3-Feb
☐ E. ON	9-Feb
☐ WIND PANEL (Houston)	16-Feb
☐ RETAIL PANEL (Houston)	17-Feb
☐ TRI-EAGLE ENERGY	18-Feb
☐ NEXTERA ENERGY	26-Feb
☐ XTEND ENERGY LP	2-Mar
☐ TOPAZ	9-Mar
☐ BRAZOS ELECTRIC	10-Mar
☐ SHELL ENERGY	11-Mar
☐ FORMOSA UTILITY	16-Mar
☐ WESTAR	TBD

Active MP Metrics (as of 2/3/2010)

Metric Name	Current Score (as of 2/3/2010)	Applies to	Weight	Green %	Red %	Yellow %	Not Scored %	Primary Criteria	Notes
MP3 Market Submissions Connectivity Qualification	Green/White goes to Amber/Red Feb 11	QSERs	Generation Ratio Share	93%	0%	0%	7%	Successful submission of RT and DAM transactions (293 total entities included sub-QSEs)	72/115 QSERS Qualified (including sub-QSEs). First "AMBER" & "RED" scores will be released 2/11/2010.
	Green/White goes to Amber/Red Feb 11	QSEs	Even weighting	67%	0%	0%	33%		119/178 QSEs qualified (including sub-QSEs). First "AMBER" & "RED" scores will be released 2/11/2010.
MP6 QSER and TSP Compliance with the Nodal Protocols Section 3.10.7.5 Telemetry Criteria	Green	QSERs	Generation Ratio Share	71%	0%	0%	29%	100% expected State Estimator telemetry submitted.	39 out of 45 QSERs completed. For the 6 QSEs in review, most issues have been resolved, leaving an estimated 23 SE points to be resolved out of 3957 required points (99%)
	First scores - 2/11/2010	QSERs	Generation Ratio Share					100% expected SCED telemetry submitted.	
	First scores - 2/11/2010	TSPs	Ownership Ratio Share					100% expected TSP telemetry per ICCP Handbook submitted	
MP11 Resource Registration	Green	REs	Registered MW Capacity Ratio Share	98%	2%	0%	0%	RARF validated, Decision Making Authority form submitted, and GENMAP validated	
MP15-B CRR Connectivity Qualification	Green/White goes to Amber/Red Feb 11	CRRAHs	Even weighting	60%	0%	0%	40%	Successful submission of CRR transactions	48/80 CRRAHs qualified. First "AMBER" & "RED" scores will be released 2/11/2010.

GREEN	Submissions complete
AMBER	Submissions not complete, but actively working with ERCOT
RED	Submissions not complete, participation not adequate

Monthly Financial Review

Don Jefferis

Interim Director – Nodal Financial Management Office

16 February 2010

Monthly Financial Review

Financials to be provided before Board of Directors meeting.

Questions?

Appendix

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

Protocol Traceability Effort Update

Tier 1 Sections					
	PTE Traced Items	Research Items	In Progress: Business Procedures	In Progress: Reports/ Extracts	PTE Alignment Items
Section 3 – Management Activities for the ERCOT system (Dec NATF)	928	171	550	193	67
Section 4 – Day Ahead Operations (Nov NATF)	635	66	63	76	3
Section 5 – Transmission Security Analysis and RUC (Nov NATF)	166	30	53	15	10
Section 6 – Adjustment Period and Real-Time Operations (Jan NATF)	926	71	441	55	39
Section 7 – Congestion Revenue Rights (Oct NATF)	445	54	58	27	1
Section 8 – Performance Monitoring (Jan NATF)	226	32	130	82	9
Section 9 – Settlement & Billing (Nov NATF)	408	0	128	55	2
Section 16.11 – Financial Security for Counter Parties (Dec NATF)	198	2	33	25	3
Section 17 – Market Monitoring & Data Collection (Dec NATF)	25	7	21	1	6
Total	3956	433	1477	529	140

Alignment Item Categories

	Total	Category of Alignment Items				
	Alignment Items	NPRR	TBD / need category	Business Requirement Update	Business Procedures Revision	Other
Section 3 – Management Activities for the ERCOT system	67	6	31	19	7	4 - Report
Section 4 – Day Ahead Operations	3	2	0	1	0	0
Section 5 – Transmission Security Analysis and RUC	10	5	0	2	3	0
Section 6 – Adjustment Period and Real-Time Operations	39	11	6	12	6	4- Report
Section 7 – Congestion Revenue Rights	1	0	0	0	0	Handbook
Section 8 – Performance Monitoring	9	2	1	3	2	1- Report
Section 9 – Settlement & Billing	2	2	0	0	0	0
Section 16.11 – Financial Security for Counter Parties	3	1	0	1	1	0
Section 17 – Market Monitoring & Data Collection	6	1	2	1	1	1- Report
Total	140	30	40	39	20	11

Transition to ERT

The SMEs are transitioning to ERT team.

ERT and PMO will prioritize the remaining work within the ERCOT Readiness activities.

- **NPRRs – SMEs work with Business Owners to draft NPRRs to put through CEO review process and governance process**
- **Alignment Items**
  - TBD Category
  - Business Requirement Updates
  - Business Procedures Revisions
  - Other
- **Research Items**
- **In Progress Business Procedures**
- **In Progress Reports / Extracts**

ERT and PMO will report to market closure of items

Protocol Traceability Effort Update

Tier 2 (Moderate): 10, 11, 12, 13, 16 – no alignment items

- For each Tier 2 section, reviewed all NPRR, reviewed the Impact Analysis for system impacts
  - Reviewed business requirements and listed appropriate sections for coverage
  - Reviewed business procedure lists and listed appropriate titles for coverage
  - Reviewed reports/extracts list on ERCOT Master Information List (EMIL) and listed appropriate

Tier 3 (Low): 1, 2, 14, 15, 18, 19, 20, 21, 22, 23, 24 – no alignment items

- For each Tier 3 section, reviewed all NPRR, reviewed the Impact Analysis for system impacts
  - Reviewed business requirements and listed appropriate sections for coverage

Full presentation can be found at ERCOT Readiness Page, under Key Documents (http://nodal.ercot.com/readiness/index.html)

Title – Protocol Traceability Tier 2/3 Presentation (as of 1/20/10)

Nodal Internal/External and Vendor Headcount 2010

To be updated and provided before Board of Directors meeting.

Program Issue:
Market Interaction Operating Level Agreements

◇ **Potential Milestone Impact: Phase 3 RTM, Phase 4 DAM/RUC, Phase 5 Full, Go-Live**

ISSUE: Market Interaction OLA	Need to determine service level agreements associated with market interactions to assist ERCOT in establishing operational thresholds. ERCOT is responsible for ensuring any market thresholds required before Go-Live are defined, managed through the appropriate stakeholder processes and communicated in a timely fashion.		
Life Cycle State			
Plan	Manage		

Mitigation Plans	Who	Target Date	Current Status
1. ORT to define OLA with business and the market for each phase.	ORT, Market Trials	March	Continuing to define Market OLAs for all subsequent Market Trial Phases as part of the ORT project plan: Phase 2.1: Complete Phase 3: Complete Phase 4: OLA Definitions in Progress
2. PMO working with ORT to ensure consistent communications and work planning is in place to deliver the appropriate OLA and market throttling recommendations for each market release.	PMO, ORT, Market Trials	January, April, May, August	Continuous communication will be delivered to the internal and external stakeholders in support of each market delivery.

Program Risk: Integration Testing

◇ **Potential Milestone Impact: Market Trials**

Risk: Integration Testing	Continued risk around technology delivery of business systems integration due to complexity and continuing maturing of application and data dependencies.

Risk Life Cycle State			
Define	Plan	**Manage**	Watch

Mitigation Plans	Who	Target Date	Current Status
• Planned Integration Test phases and associated functional and technology components. • Created effort-based testing delivery work plan to prioritize and align deliverables to key external milestones. • Instituted daily PMO meetings to manage and mitigate day-to-day risks to scope and schedule deliverables.	PMO	Ongoing	Nodal Program Release Scope and Schedule defined to ensure delivery. Program Status Report and Dashboard in place to track progress.

Program Issue:
Network Model Load Frequency

◇ **Potential Milestone Impact: Overall Program**

ISSUE: Network Model Load Frequency	*Model updates for Nodal will require more attention and coordination by both MPs and ERCOT to ensure alignment. ERCOT has determined that a bi-monthly Nodal database load represents the most manageable solution for updating the real-time environment when Nodal begins in December 2010.*		
Life Cycle State			
Plan	Manage		

Mitigation Plans	Who	Target Date	Current Status
1. Define and document Initial Model Load Process.	ERT	Complete	Initial Process Documented, to be updated based on feedback from Testing and Operations teams.
2. Validate and improve the Model Load Process over the next several months based on a Zonal Bi-Weekly load timeframe.	INT, INF	January - March	Initial loads completed, targeting mid January Model load to align with Zonal schedule.

Program Risk:
Reconciling Protocols, Systems, and Market Expectations

◇ **Potential Milestone Impact: Market Trials**

Risk: Reconciling Protocols, Systems and Market Expectations	Experience with deploying nodal markets by other ISOs has shown that expectations of the market participants are often missed, despite best efforts at defining tariffs or protocol requirements. ERCOT needs to assume such a risk exists for this nodal implementation as well.			
Risk Life Cycle State				
Define | Plan | **Manage** | Watch				
Mitigation Plans	**Who**	**Target Date**	**Current Status**	
1. Assess maturity and readiness of software in the initial nodal release, focusing on new/tailored capability for Texas Nodal.	B. Day K. Farley	Complete	02/02/10 – Met with NATF on 1/29/10 to finalize reporting and traceability effort . Transitioned open items to ERT to track to completion.	
2. Add team members to the nodal program with Texas market experience to ensure readiness for Market Trials. SMEs to discussion alignment issues with ERCOT business owners. SMEs to report the results of the assessment to the ERCOT business owners for resolution.	V. Gates	Ongoing	02/02/10 – Transitioned to ERT in order to track closure of alignment items	
3. Keep the oversight groups apprised of progress.	M. Cleary	Ongoing	02/02/10 – status reports provided to program, NATF, TAC, Special Nodal Committee monthly.	