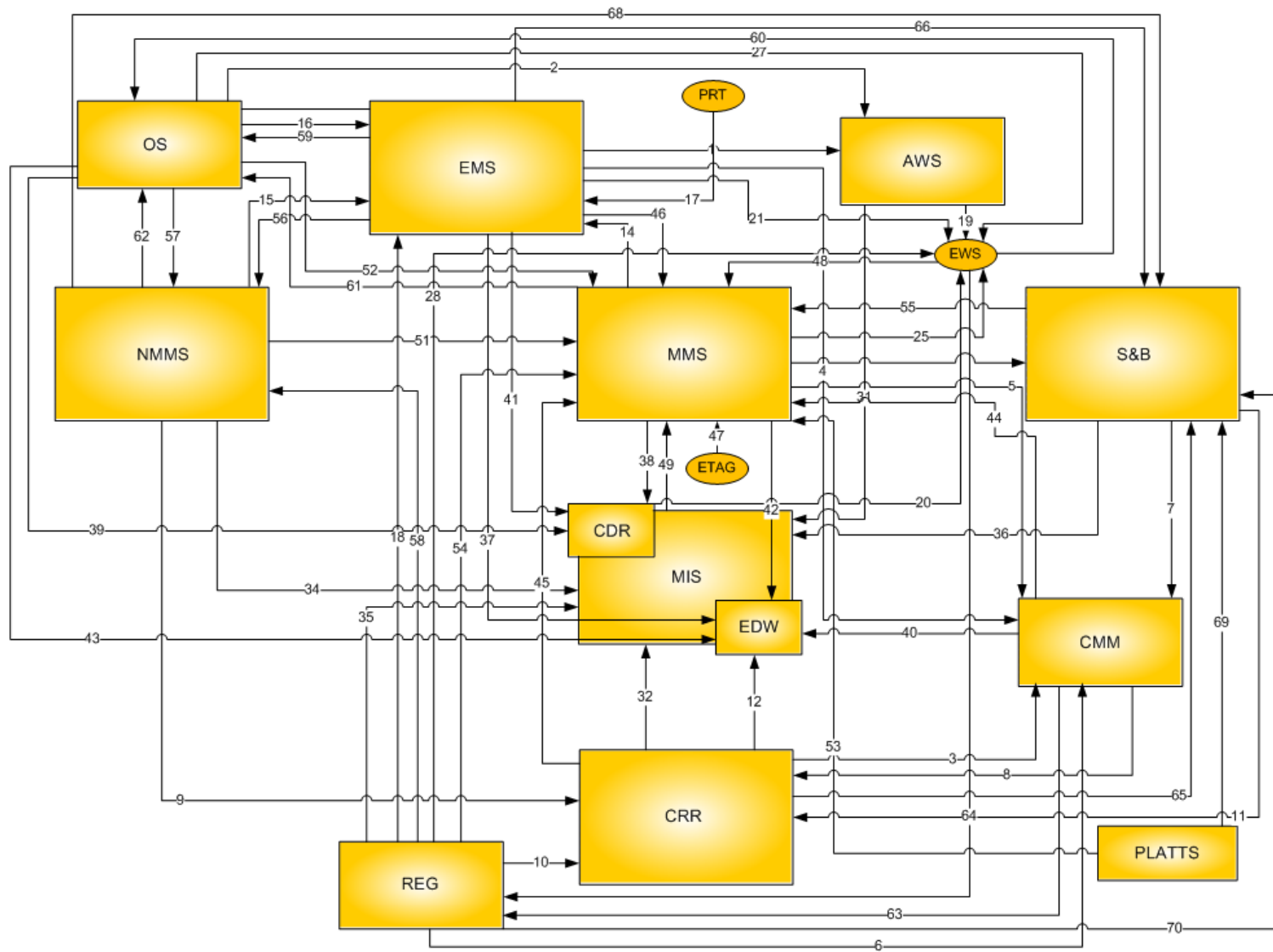# Nodal Program Update

Mike Cleary

Sr. VP and Chief Technology Officer

Agenda
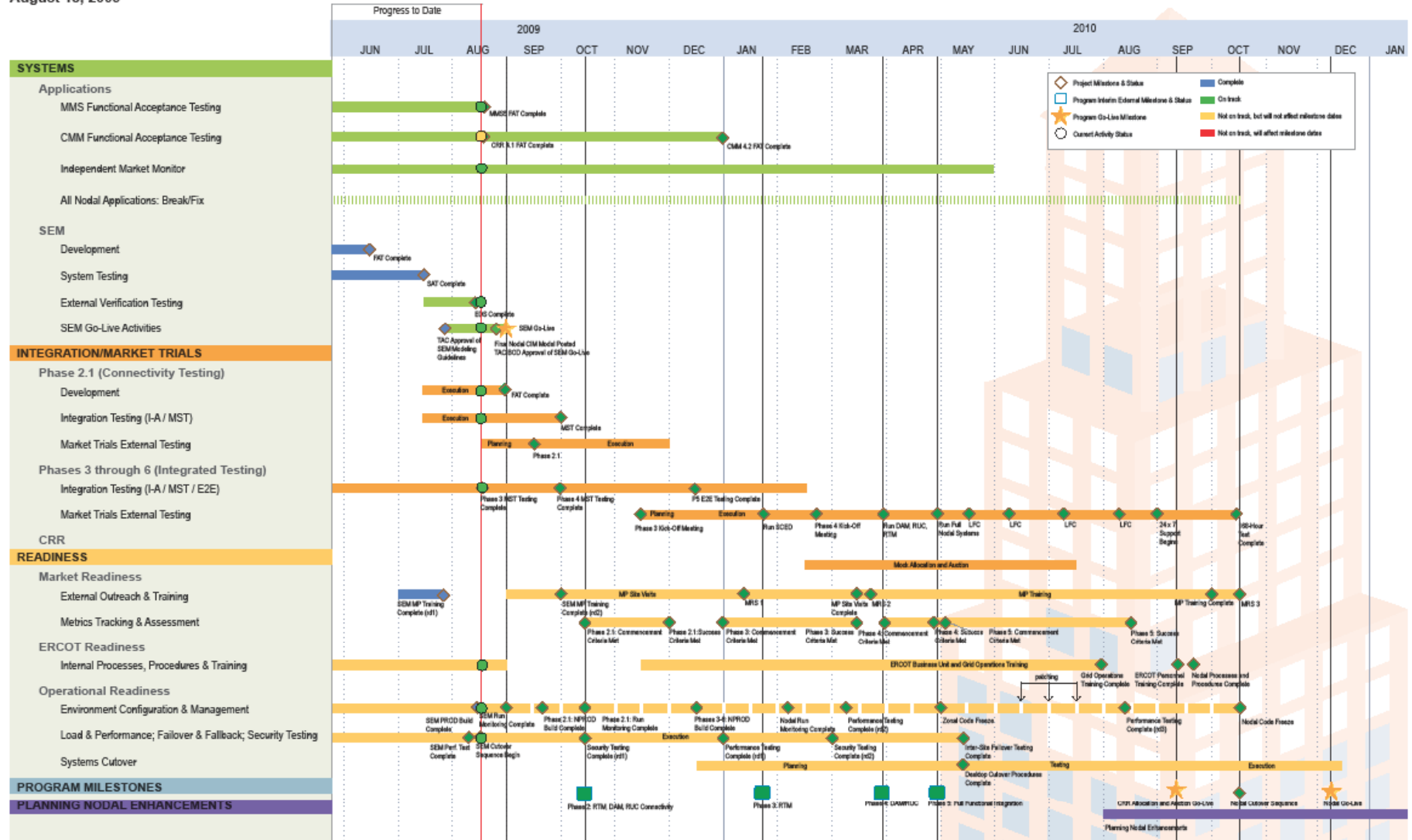
- **Nodal Integration**

- **Risks/Issues**

- **Accomplishments**

- **Integration**

- **Financials**

- **Appendix**

Nodal Timeline

Nodal Program Timeline
August 18, 2009

Risks & Issues to Achieving Nodal's Major Milestones

◇ **Complete Integrated Systems (2-12-10)**

  – Issue: Resource constraints for Nodal Program

  – Issue: Handling CMM delays for program

◇ **Market Trials (2-12-10)**

  – Risk: Reconciling protocols, systems and market expectations

◇ **Nodal Go-Live (12-1-10)**

  – Risk: Data Center capacity concerns

  – Risk: Integrity of network model data from market participants

CMM Milestone Slip

- **CMM 4.1**
  - 6 of 8 CMM 4.1 components have exited FAT
    - External Reports pushed back to Aug. 21
    - Vendor re-work will push Twelve Trailing Months to Aug. 31
  - Good progress made working through defects found in custom components delivered in July
  - CMM 4.2 work has begun concurrently
  - CMM focus on testing, defect remediation for components required for End-to-End Testing
  - No impact to End-to-End schedule

Significant Accomplishments

- **SEM Go-Live**

- **Planning**
  - Delivery Assurance: Ground-up analysis to determine remaining work
    - People, processes, technology
  - Ensure program has effort-based, resource-loaded, integrated and dependent work plans

- **Integration Testing Update**
  - All major systems have consumed, executed against common data set
  - All major systems have started Integration Testing
  - CRR auction has been executed twice in integrated environment and results processed by settlement and market systems.
  - Market Web Services, Outage Scheduler are undergoing integrated testing with common data set ("string tests")

	Integration Testing (I/A)		End-to-End Testing (E2E)			
Phase	I/A Testing Phase		E2E Phase 1	E2E Phase 2		E2E Phase 3
Dates	Apr 2009 to Sep 2009		Jul 2009 to Nov 2009	Sep 2009 to Dec 2009		Jan 2010 to Mar 2010
Quality	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Objective	Installation with Smoke Test (data transferred)	Connector execution with Common Data	System-to-System with Common Data	Technical Stability with Normal Load	Full set of Business Outcomes	Defined Scenarios
Indicator	Connectors			Systems and Components	Business Outcomes	Scenarios
Data	Common Data Set			Representative Data		Manipulated Data
Execution	Connector Test Scripts		Business Strings	Operating Procedures		Alternative Operating Procedures

Integration Testing Status

Connector Scorecard (78 Total)					
	Definition	**Completed**	**In Progress**	**Deferred**	**Not Started**
Level 1	Connector installed; one record transferred through connector ("smoke test").	65 (83% complete)	5	0	8
Level 2	Connector tested using a common data set with multiple records.	33 (45% complete*)	26	5	14
Level 3	System-to-system functional test; connector tested with system-generated data.	13 (17% complete*)	17	1	47

* Less Deferred count (items that cannot be tested in the iTest environment

Target Completion

- – Levels 1 & 2 → September 22, 2009   On Target
- – Level 3 → November 13, 2009   On Target

Risks & Issues

Monthly Financial Review

Steve Byone

Nodal Program
Approved Forecast to Actual Comparison
Month of July 2009

Line	Cost Summary	Forecast	Actual	Forecast Variance	Forecast Cumulative Variance (Pending Contingency Mgmt Disposition)
1	Internal Labor Costs	$2.1	$2.1	$0.0	$3.6
2	Backfill Labor Costs	0.1	0.1	0.0	-0.2
3	External Resource Costs	5.4	4.0	1.4	10.2
4	Software & Software Maintenance	1.8	0.3	1.5	0.9
5	Hardware & Hardware Maintenance	0.4	0.1	0.3	2.0
6	Other	0.0	0.0	0.0	0.4
7	**Sub-total Direct Project Costs**	$9.8	$6.6	$3.2	$16.9
8	**Contingency Costs**	$0.0	$0.0	$0.0	$0.0
9	Allocations	$0.4	$0.3	$0.1	$1.6
10	Finance Charges	0.9	1.0	-0.1	0.9
11	**Sub-total Indirect Project Costs**	$1.3	$1.3	$0.0	$2.5
12					
13	**Total**	$11.1	$7.9	$3.2	$19.4

Amounts in millions

Nodal Program
Approved Forecast to Actual Comparison
Life-to-Date through July 2009

Line	Cost Summary	Forecast	Actual	Forecast Cumulative Variance (June/July)	Forecast Remaining
1	Internal Labor Costs	$45.3	$45.2	$0.1	$39.1
2	Backfill Labor Costs	4.8	4.8	0.0	2.9
3	External Resource Costs	235.4	233.5	1.9	53.7
4	Software & Software Maintenance	27.4	26.0	1.4	10.7
5	Hardware & Hardware Maintenance	47.7	47.7	0.0	8.3
6	Other	2.2	1.9	0.3	0.7
7	**Sub-total Direct Project Costs**	**$362.8**	**$359.1**	**$3.7**	**$115.4**
8	**Contingency Costs**	**$0.0**	**$0.0**	**$0.0**	**$58.6**
9	Allocations	$18.1	$18.2	-$0.1	
10	Finance Charges	19.6	19.7	-$0.1	
11	**Sub-total Indirect Project Costs**	**$37.7**	**$37.9**	**-$0.2**	
12					
13	**Total**	**$400.5**	**$397.0**	**$3.5**	

Amounts in millions
*Note 1: "Forecast Remaining" allocations and finance charges will be determined upon final program EAC.*
Note 2: "July/June Forecast Cumulative Variance" consists of actuals through May 2009 and forecast for June and July

Board Discretionary Fund

Current View

Detail of Cumulative Variance (Pending Contingency Mmgt Disposition)

LEGEND

Board of Directors Discretionary Fund

Cumulative Variance – Potential Increase
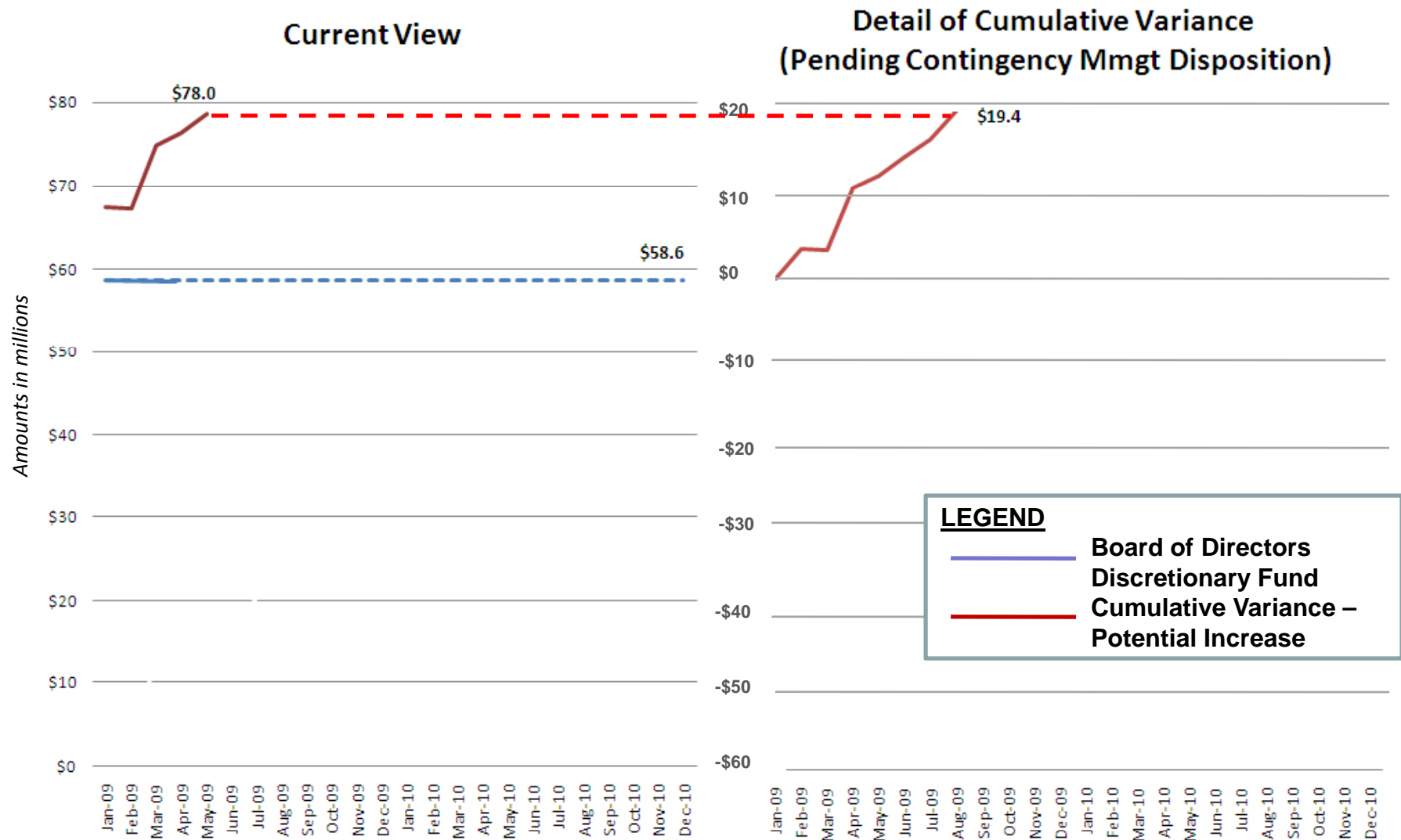
Program Cost Management

Monthly Budget, Forecast and Actual Analysis
(Amounts in millions)
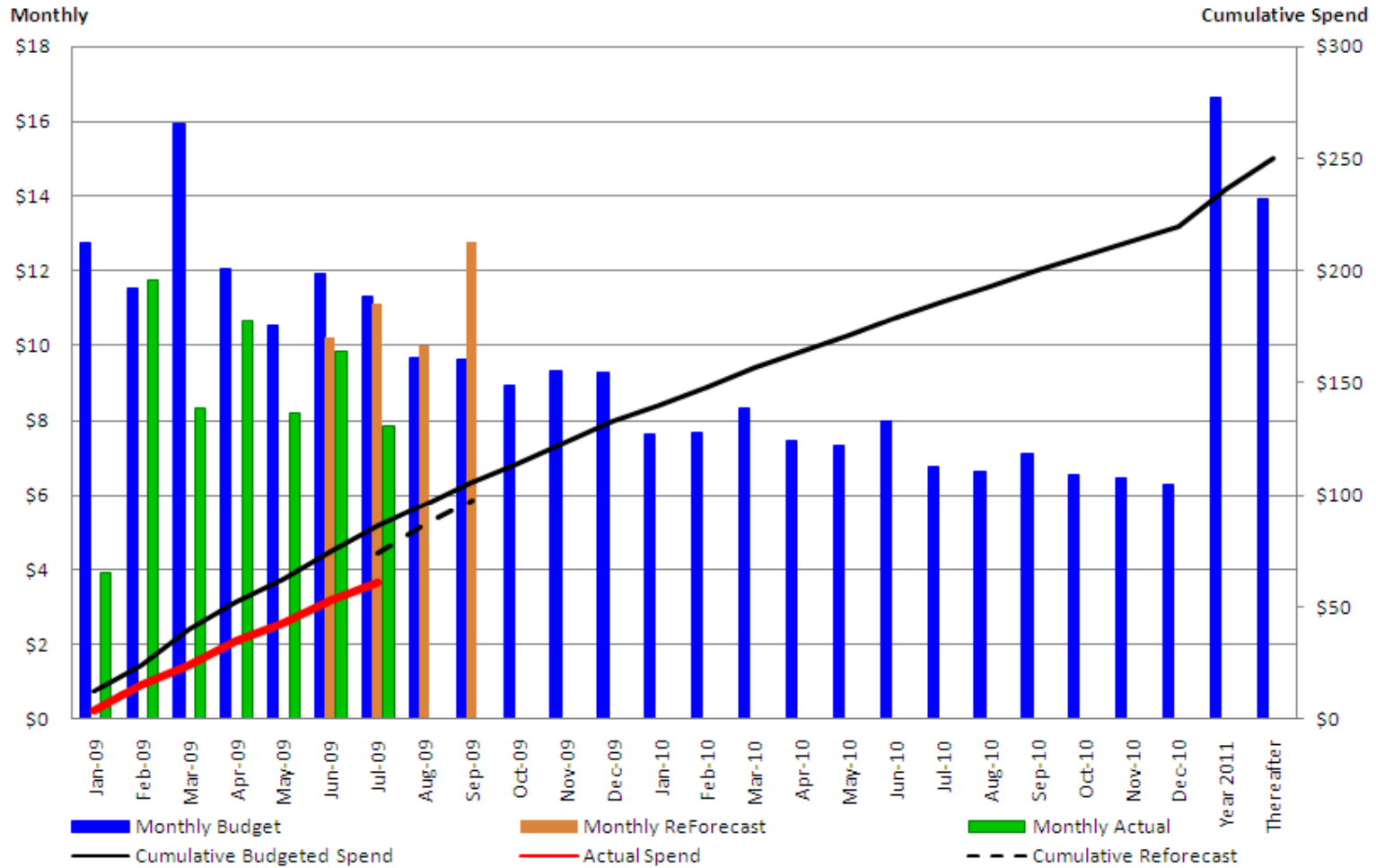
Footnote: Reforecast as of June 26, 2009

Questions ?

Appendix

Market Systems Update

Project	Sub-Project	Status	Open Critical Defects July 30/Aug. 13		
MMS		• On schedule • MMS 5 final release; currently in FAT and scheduled to exit Aug. 21 • MMS 5 Patch A (interface defects) installation scheduled July 31 • 14 interfaces to test by Sept. 1; testing now underway • Market Manager UI to exit FAT July 31; weekly defect cycles planned to address remaining defects in iTest	**MMS5**		
			Sev 1s 1	1	
			Sev 2s 3	4	▲
			Sev 3s 76	92	▲
CRR		• On schedule • CRR 1.9 final release; exited FAT July 28 (1 month early) • All 9 interfaces in iTest; 4 in execution phase, 5 completed	**CRR 1.9**		
			Sev 1s 0	0	
			Sev 2s 0	0	
			Sev 3s 0	0	
COMS	CMM	• Behind schedule • CMM 4.1 in FAT at 98% completion; targeted to exit Aug. 21 • Remaining components combined with CMM Phase II to exit FAT February 2010 (internal functions only) • 4 of 5 interfaces currently in iTest • Outstanding release: CMM Phase II (4.2)	**CMM 4.1**		
			Sev 1s 1	0	▼
			Sev 2s 42	8	▼
			Sev 3s 50	36	▼
	S&B	• FAT testing complete; all interfaces currently in iTest • Targeting refactoring completion by September 2009	Sev 1s 0	0	
			Sev 2s 0	0	
			Sev 3s 2	3	▲
	CSI	• FAT testing complete • Targeting refactoring completion by August 2009	Sev 1s 0	0	
			Sev 2s 0	0	
			Sev 3s 1	10	▲
	REG	• Interface/Adapter Level 1 and Level 2 completed • Team is currently working on I/A Level 3 testing	Sev 1s 0	0	
			Sev 2s 0	0	
			Sev 3s 0	0	

Reliability Systems Update

Project	Status	Open Critical Defects July 30/Aug. 13		
NMMS	• On schedule • NMMS 7 final release; exited FAT June 30, installed in iTest on July 14 • All 3 interfaces have exited FAT and are currently in iTest (2 complete)	**NMMS 7**		
		Sev 1s	1	1
		Sev 2s	0	0
		Sev 3s	50	50
EMS	• On schedule • EMS 6 Patch 4 currently in FAT • All 13 interfaces have completed Level 1 & 2 testing	**SPR Patch 3**		
		Sev 1s	0	0
		Sev 2s	0	0
		Sev 3s	102	100 ▼
OS	• On schedule • Common test plan for 12 of 13 interfaces complete • 2 defect patches planned for OS UI	**OS 2.1.4**		
		Sev 1s	0	0
		Sev 2s	8	5 ▼
		Sev 3s *	73	72 ▼
		* excluding ROO defects		

Market Verification Update

Project	Status	Open Critical Defects July 30/Aug. 13		
Interface/Adapter Testing	• MMS loaded common dataset and received software upgrade to enable interface with CRR, EMS, S&B and other applications. • Executed first Day-Ahead Market and SCED runs in integrated environment with several integration defects.	**FAT Defects**		
		Sev 1s	3	2 ▼
		Sev 2s	97	33 ▼
		Sev 3s	421	431 ▲
		iTest Defects		
		Sev 1s	1	1 ▼
		Sev 2s	67	56 ▼
		Sev 3s	73	64 ▼

End-to-End Testing	• Phase 1 of End-to-End Testing underway; first phase focuses on running E2E functions "string" in the integrated environment with a common dataset:
	    • String 1: CRR completed auction
	    • String 2: Outage Scheduler
	    • String 3: Market Web Services
	    • String 4: Day-Ahead Market
	    • String 5: Reliability Unit Commitment
	    • String 6: Real-Time Market/SCED
	    • String 7: Supplementary AS Market			

Market Trials	• SEM Go-Live remains on track for Aug. 31; TAC, Board to review Aug. 18. • All 20 TSPs engaged by ERCOT (120 registered users).			
Market Readiness	• Targeting 35 MP outreach site visits. • Identified key resources to execute program.			
ERCOT Readiness	• Identified 20 departments affected by nodal process; completing detailed transition plans. • 255 employees yet to complete nodal training (remainder in compliance).			
Operational Readiness	• System cutover validation under way. • NMMS performance testing under way.			

Program Issue:
Handling CMM Delays for Nodal Program

◇ **Potential Milestone Impact: Complete Integrated Systems**

Issue: Handling CMM Delays	Delays in completing the detailed requirements and designs for CMM have occurred because of turnover in both ERCOT and vendor staff. There are limited business resources allocated to complete creation of requirements and to perform reviews.			
Issue Life Cycle State				
Plan | **Manage**				

Mitigation Plans	Who	Target Date	Current Status	
1. Break the definition and development of remaining CMM capability into incremental releases. Modify contract with vendor to fit the approach.	H. Parrish	COMPLETE	Complete 6/19/09 SOW was executed this week	
2. Identify ERCOT business resources to ensure the plan can be executed.	H. Parrish	COMPLETE	Complete 6/5/09 2 backfill positions filled	
3. Identify vendor resources to ensure the plan can be executed.	H. Parrish	COMPLETE	Complete 6/29/09 Triple Point staff coming to ERCOT site, to fix defects found during testing	
4. Receive software and perform FAT in increments, to keep overall program on schedule.	H. Parrish	8/14/09	07/20/2009-All deliverables have been received and Phase 1 FAT targeted for Mid Aug and the Phase 2 FAT by Feb 2010 6/29/09 Increments needed for end-to-end testing will be complete by end of July, with other changes delivered by Feb. 2010.	

ERCOT-Wide Issue:
Zonal Resource Constraints for Nodal Program

◇ **Potential Milestone Impact: Complete Integrated Systems**

<table>
<tr>
<td colspan="2">Issue: Zonal Resource Constraints for Nodal Program</td>
<td colspan="3" rowspan="2">Because the Nodal go-live date has been delayed, there are a number of Zonal projects, PRRs, and IMM suggestions for Zonal improvements that result in resource constraints for the Program.</td>
</tr>
<tr>
<td colspan="2">Issue Life Cycle State</td>
</tr>
<tr>
<td>Plan</td>
<td>Manage</td>
<td></td>
</tr>
<tr>
<td>Mitigation Plans</td>
<td>Who</td>
<td>Target Date</td>
<td colspan="2">Current Status</td>
</tr>
<tr>
<td>1. Manage list of PRRs and SCRs to a resource plan that uses a strategy to avoid impacting program personnel resources when delivering additional Zonal enhancements.</td>
<td>D. Forfia
D. Troxtell</td>
<td>Ongoing</td>
<td colspan="2">6/19/09 – Comprehensive round of EAC reviews have been conducted with all Nodal projects
5/15/09 – Meetings were held, to review EACs with Mike Cleary and Janet Ply, with updates made</td>
</tr>
<tr>
<td>2. Manage Project Priority List (PPL) with clear view of resources needed for any projects in flight or about to be launched, with a strategy to avoid impact on Nodal personnel resources.</td>
<td>D. Forfia
D. Troxtell</td>
<td>Ongoing</td>
<td colspan="2">6/17/09 – Solution has been established to be used for monthly data analysis and resolution of resource constraints. In the process, effort hours are gathered for Zonal projects, Nodal work, and Base work. Over-allocations are determined, and meetings are held to resolve.</td>
</tr>
</table>

◇ **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	12/15/09	7/17/09 – Work is underway to trace protocols, requirements, and test cases; alignment and gap analyses are in progress
2. Add team members to the nodal program with Texas market experience to ensure readiness for Market Trials. Have them assess completeness of requirements addressed by the software new/tailored for the Texas nodal market and participate in end-to-end testing.	B. Day K. Farley	Ongoing	7/17/09 – Work is in progress, with one team member consulted by those doing integration test planning 6/5/09 – Two team members are on board who have Texas market expertise, working in Betty Day's team on Protocol Traceability
3. Keep the oversight groups apprised of progress.	M. Cleary	Ongoing	4/13/09 Risk incorporated into the set being reported externally; will be maintained actively.

ERCOT-Wide Risk:
Data Center Capacity Concerns

◇ **Potential Milestone Impact: Nodal Go-Live**

Risk: Data Center Capacity Space Concerns	Data center capacity, space, and power may be inadequate for Nodal go-live, unless plans for expansion are adequate.		

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

Mitigation Plans	Who	Target Date	Current Status
1. Establish an Information Lifecycle Management approach, to manage the life cycle of data being managed.	D. Forfia	Implementation expected Q1 2010	7/17/09 Work is in progress 3/31/09 ILM Roadmap has been completed by SAIC, and next planning activities underway ERCOT project PR 90006_01 Commercial Systems Information Lifecycle Management: Project
2. Expand current data center space, and build out new data center, to increase ERCOT data center capacity.	D. Forfia	TCC1 build out complete 9/09 South DC in production Feb 2011 TCC3 in production May 2011	7/31/09 TCC Expansion construction is ahead of schedule. New Data Center construction is underway.
3. Validate and monitor Nodal data capacity assumptions for Go Live	D. Forfia	Ongoing	7/17/09 Status reports are provided to the Board of Directors in executive sessions

Program Risk
Integrity of Network Model Data from Market Participants

◇ **Potential Milestone Impact: Nodal Go-Live**

Risk: The model of the physical network inhibits healthy economic signals to the market	Some market participants may not populate the network model with all required transmission element data and attributes. This inaccurate model may not solve, or it may create erroneous solutions. This can make the nodal systems appear to be functioning improperly.		
Risk Life Cycle State			
Define · **Plan** · Manage · Watch			
Mitigation Plans	Who	Target Date	Current Status
After Single Entry Model Go-Live, ERCOT will engage TSPs to validate the network model, in preparation for Market Trials	M. Mereness	September, 2009 through February, 2010	6/9/09 ROS and NDSWG will be engaged to determine the activities required during this validation period
Each TSP will confirm that they have populated the model with data that is complete and accurate, and that they are prepared to transition to the Nodal Protocol timeline for updates.	V. Gates M. Mereness	February, 2010	Plans TBD
ERCOT will work with market participants to review the quality of solutions with the model data and identify areas in which data accuracy needs to be improved.	V. Gates M. Mereness	February, 2010 through December, 2010	Plans TBD