Texas Nodal Program Update

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Executive Director, Texas Nodal Program

Board of Directors Meeting

May 16 2007

Agenda

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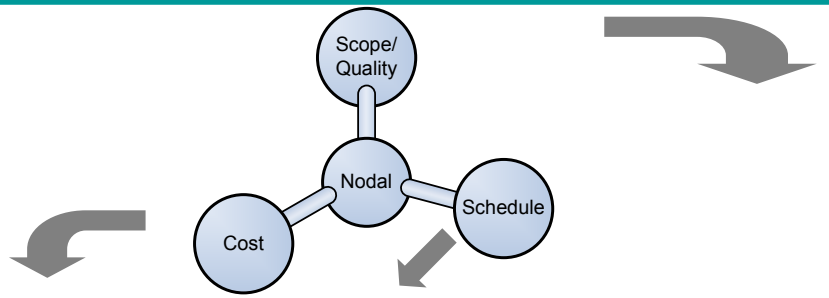
IBM recommendations – we'll act on all but have a different view of priorities

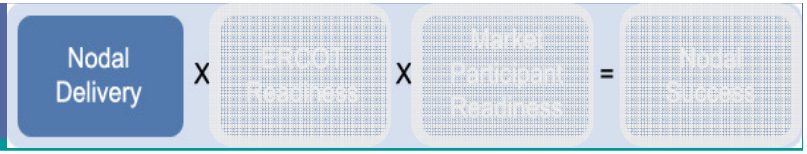
IBM #	IBM Recommendation	Our Vision / Comments
5	Determine ERCOT Target Organization and components of employee transition	Nodal risks losing critical ERCOT FTEs, (none have yet left ERCOT since December, but vendors and market participants are attractive options)
6	Simplify approval process for contractor extensions	Acquiring & renewing contractors is too protracted, especially if we lose subject matter experts.
8	Provide responsible manager to for all testing events including EDS	A testing Tsar is designated to integrate multiple efforts, effective 1 May 2007.
3	Update Communications Plan to ensure specific cascading communications	More proactive communications required as EDS sequences under way – this will be a constant effort
2	Forecasts linked to productivity and deliverables in work scheduled	Improvements to planning & control cycles have been underway since January.
1	Integrate work plans	
7	Accelerate implementation of and compliance with QA Policy	
4	Accelerate transition process for single Risk and Issue Tool	

Amber status is being maintained – under continuous review



	Cost	Schedule	Scope / Quality
	Amber	Amber	Amber
Comments	- Latest monthly committed cost and forecasts are under by 10% of budget to date. - Funding for Identity Management, integration builds, and Change Requests being identified. - Concerns over ERCOT staff vulnerability.	- Early start of four Early Delivery Systems (EDS) will help to ensure go-live on 1 December 2008. - Market Readiness Seminar for MPs held to motivate their readiness. - EDS 1&2 underway, EDS early schedule being validated.	-Backlog baseline established & impacts categorized. - First set of 15 NPRRs passed through revised ERCOT process. -- Market Readiness metrics drafted for TPTF review. - Process for scope changes to be discussed with BoD
Legend			
Red	Estimate at Complete = >$263m	Go-live = >30 days+	Program is not wholly aligned to protocols
Amber	Estimate at Complete = $248 - $263m ✓	Go-live = <30 days+ ✓	Program is aligned to previous version of protocols ✓
Green	Estimate at Complete = <$248m	Go-live = 12/1/08	Program is aligned with current protocols

Major achievements have continued into May…



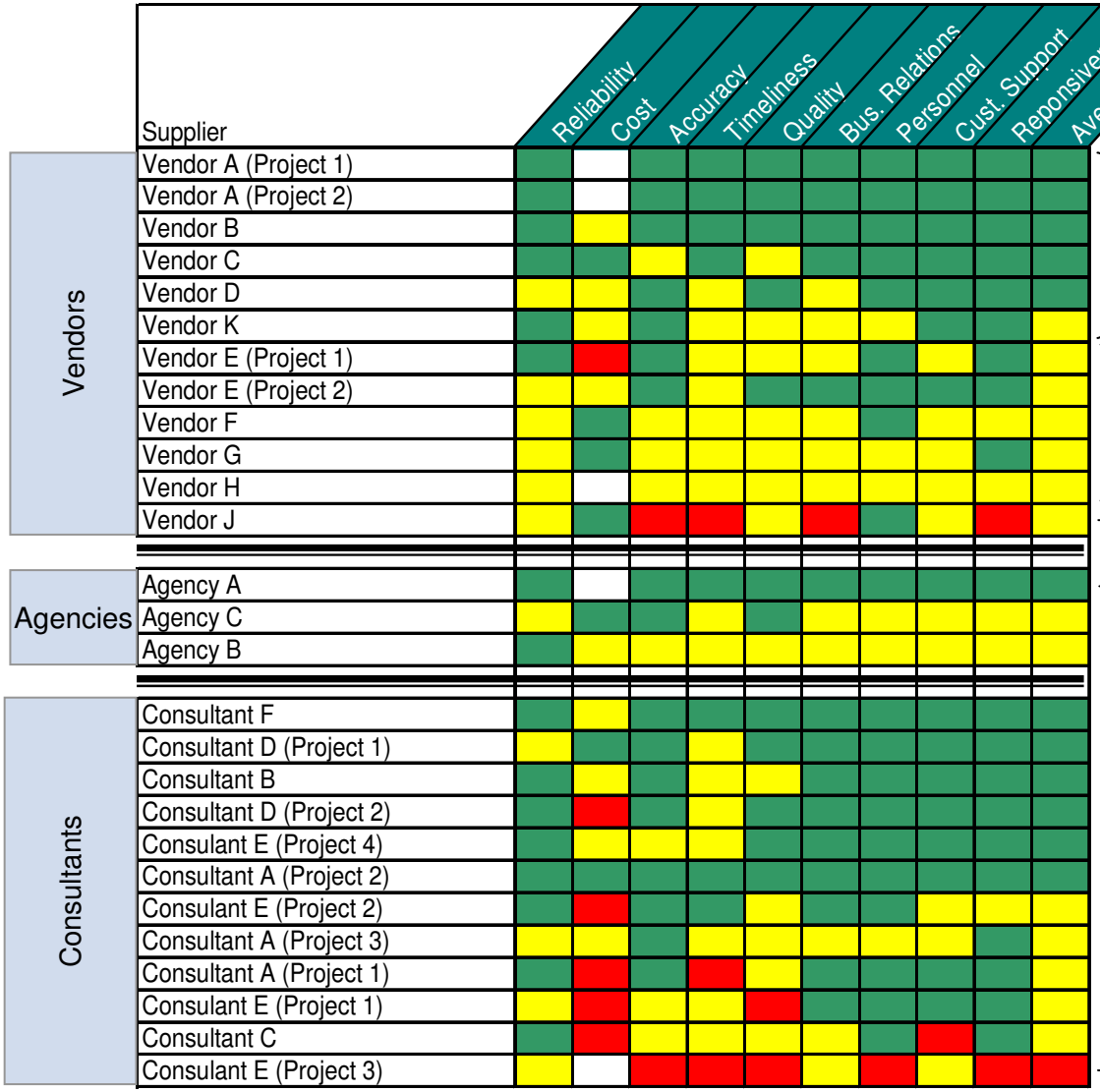
Control Milestone	*Baseline*	*Actual/Forecast*	
Program Budget baselined	10/17/2006	10/17/2006	✓
Requirements approval	10/31/2006	02/2007	×
Key CSD submissions	12/31/2006	12/31/2006	✓
Market Operations Sandbox	01/31/2007	01/31/2007	✓
Key CSD approval	02/28/2007	02/28/2007	✓
Interface specs – final	03/31/2007	03/31/2007	✓
First interface exposed to MPs	03/31/2007	03/31/2007	✓
EDS 1 start	05/15/2007	04/01/2007	✓ *Early*
EDS 2/3 plan shared with TPTF	04/2007	04/2/2007	✓ *Early*
EDS 2 start	08/2007	07/2007	*Early*
EDS 3 start	10/2007	07/2007	*Early*
EDS 4 plan shared with TPTF	09/2007	07/2007	*Early*
EDS 4 start	07/2008	01/2008	*Early*
Real Time Go Live	12/1/2008	12/1/2008	*On time*
Day-Ahead Go Live	12/8/2008	12/8/2008	*On time*

- **Vendors, Requirements, and CSDs**
  - Many vendor base products have been delivered ahead of schedule
  - All vendors working on aggressive delivery schedule to make Nodal timelines
  - Outstanding approvals relate to EDW (non-critical)
  - Overwhelmingly positive response from Market Participants
  - Requirements being updated to March 2007 Nodal Protocol Baseline
  - All CSDs with the exception of EDW and Disputes (planned for 2Q2007) have been submitted or are approved from TPTF
  - Most projects have started detailed design and build phase
- **Projects**
  - EMS: Nodal ICCP installation complete
  - MMS: Accelerated SCED pre-FAT testing nearly complete and on schedule
  - COMS: Lodestar Version 4.7 delivered successfully
  - NMMS: Phase 1a delivered successfully
  - MIS: prototype delivered early
  - Interfaces (EIP): Enterprise Integration Project delivered final ERCOT/MP Interface Specs
  - Interfaces (EIP): First interfaces exposed to market for MPs to test connectivity and offers
  - Interfaces (EIP): About to select a System Integrator to build interfaces
  - Interfaces (EIP): Substantial work in progress on multiple internal integrations, for example analyzing source and sink systems
  - MER: Market Readiness brochures for MP readiness created and distributed
  - Training: Launched web based training classes
  - Training: Launched LMS (Learning Management Seminar) to automate testing
- **Market Operations Sandbox**
  - The goal is to prove the feasibility of the architecture and to promote Market Participant engagement
  - 3 Sandbox interfaces implemented and 19 MPs have tested
  - Market Operations Sandbox and interface deployment schedule produced before the 4/30/2007 milestone to TPTF

Future milestones are dictated by the Nodal Build critical path schedule

An assessment of all vendors has been completed by ERCOT…

Nodal Delivery X ERCOT Readiness X Market Participant Readiness = Nodal Success



Largest Product Vendors all in this group

Mid-size vendors

Small vendor struggling to meet program demands and expectations

One clear leader

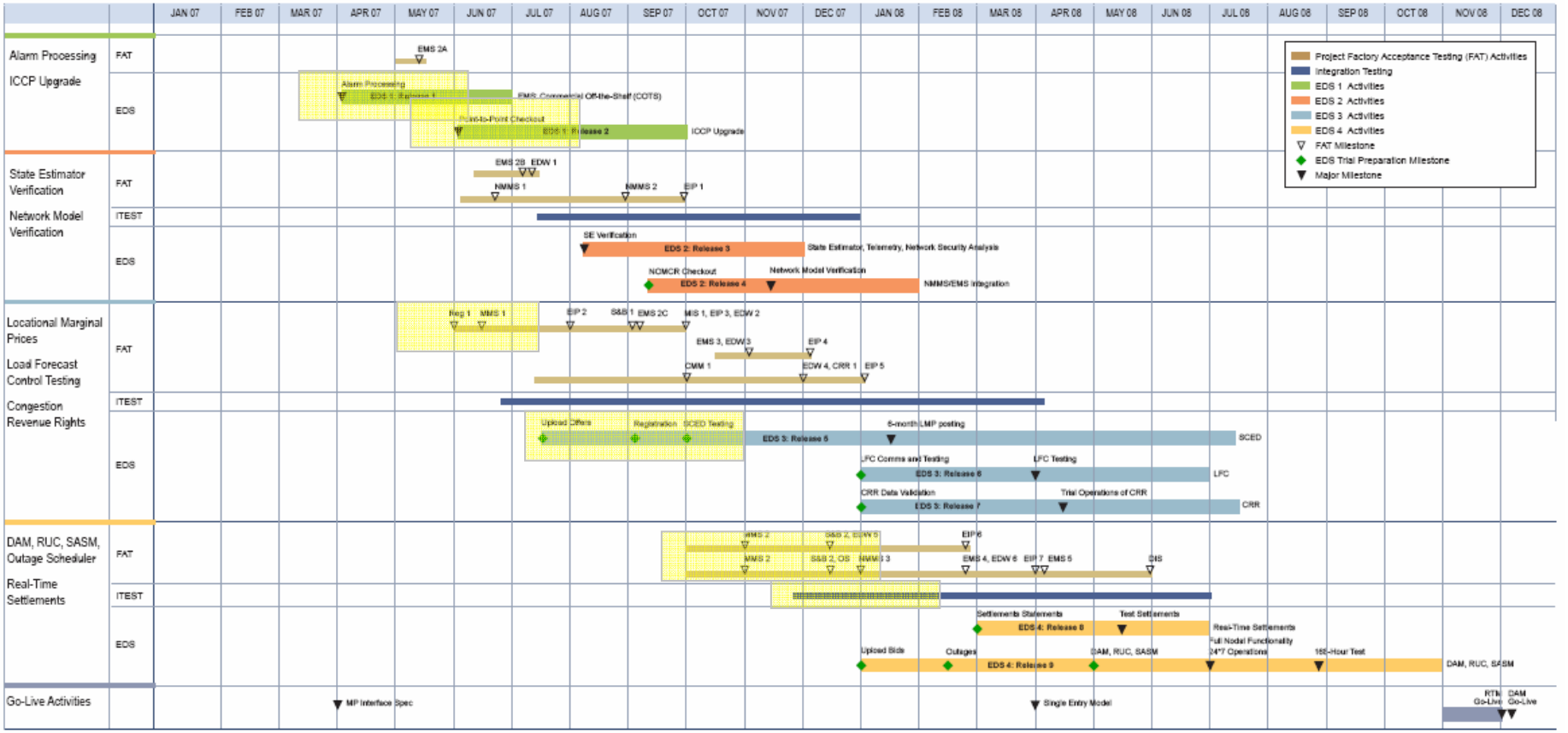
Most major firms performing as expected, but questionable value-add from tactical assignments

Corrective action taken to resolve

The timeline with earlier EDS has been shared with market participants

Nodal Delivery X ERCOT Readiness X Market Participant Readiness = Nodal Success

Early Delivery System Sequence Timeline



EDS 1 Release 1: Alarm Processing

EDS 1 Release 2: ICCP Upgrade

EDS 2 Release 3:
EMS
- SE Perf. Standards
- Network Security Analysis
- SPS/RAP
- SCADA
- Dyn. Ratings - Single Model
- Telemetry Perf Standards

EDW
SE Statistics

EDS 2 Release 4:
NMMS
- Network Model
- NOMCR

EMS
- EMS/NMMS Interface

EIP

EDS 3 Release 5:
MMS
- SCED

EMS
- NSA
- RLC

COMS
- Settlements and Billing (S&B), FIP, FOP, Verifiable Costs
- Registration

Enterprise Integration Project (EIP)
Market Information System (MIS)
Enterprise Data Warehouse (EDW)

EDS 3 Release 6:
EMS
- LFC

EIP, EDW

EDS 3 Release 7:
CRR
COMS
- CMM

EDW
EIP

EDS 4 Release 8:
MMS
- All Markets
- Outage Scheduler

EMS
- Load Forecast, Outage Evaluation

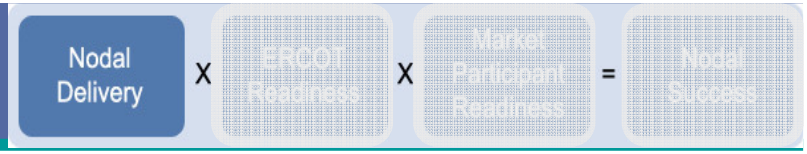
NMMS
S&B
EIP, EDW

EDS 4 Release 9:
MMS
- RT Settlements Interface
- S&B

EIP, EDW

Early starts of the Early Delivery Systems

The EDS 1 & 2 detailed planning and execution activities are underway …



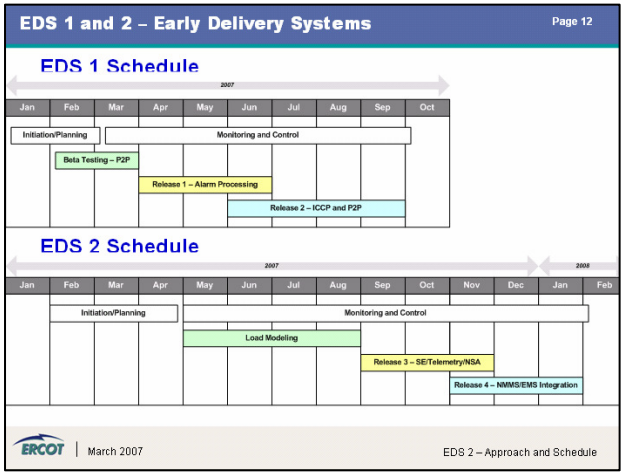
EDS 1 (Alarm Processing and Point to Point Verification)

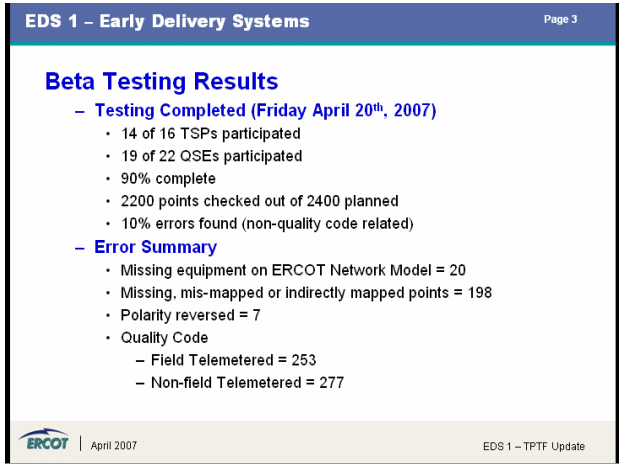
- ☑ ***Approach:*** Approach document drafted and approved by TPTF
- ☑ ***Beta Testing:*** Beta Test identified 10% error rate.
- ☑ ***Point-to-Point Verification:*** ERCOT recommendation for complete point-to-point verification approved by TPTF
- ❑ ***EDS Execution:*** Alarm processing configuration initiated, Point-to-Point testing to begin June 07

EDS 2 (Load Modeling, State Estimator, Network Security Analysis and Network Model Management Verification)

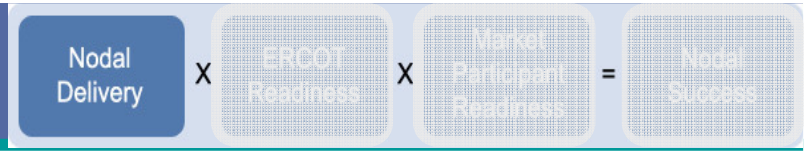
- ☑ ***Approach:*** Draft document issued for TPTF review and comments.
- ❑ ***Updated Approach:*** Revised document to be released week of May 7th.
- ❑ ***EDS Execution:*** Scheduled to begin in May 07.

The diagrams show the EDS timelines and high-level functionality for each of the phase & Beta Test results





The EDS 3 & 4 detailed planning and execution activities are ramping up …



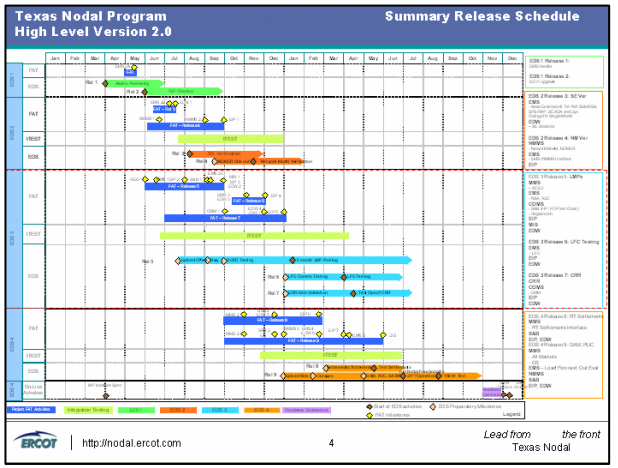
EDS 3 (Security Constrained Economic Dispatch (SCED), Load Frequency Control (LFC), and Congestion Revenue Rights (CRR) trial Auction)

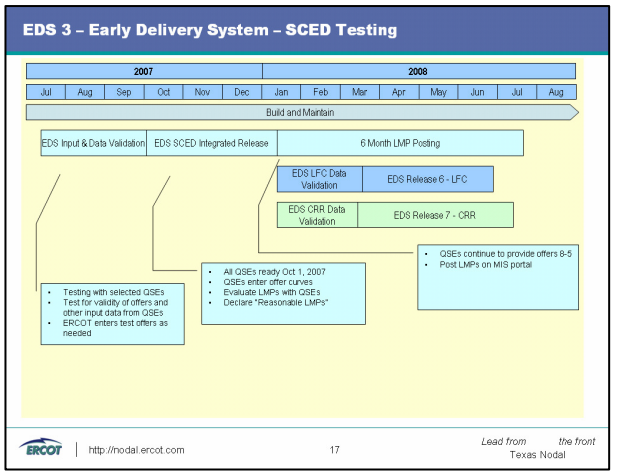
- ☑ **Approach:** Draft document issued for TPTF review and comments.
- ☑ **Detailed Plan:** Detailed plan issued for TPTF review and comments.
- ❑ **MP Handbook:** Document Market participant EDS day to day testing activities and scenarios. Draft version scheduled for end of May release.

EDS 4 (Day-Ahead Market (DAM), Reliability Unit Commitment (RUC), Supplementary Ancillary Services Market (SASM), Settlements and Outage Scheduler, and 168 hour test)

- ❑ **Approach:** EDS 4 approach document to be issued for May 5 TPTF meeting

The diagrams show the overall EDS schedule and high-level EDS 3 timelines





Early Delivery System (EDS) High Level Scope

The objective of market trials is to confirm through a series of structured and unstructured tests that: "stable and accurate operations of the SCADA, Network Security Analysis, Transmission Constraint Management, SCED, LFC, DAM, RUC, and real time settlement system can be declared" as outlined in the Nodal Transition Plan.

EDS1

- Ensure data and telemetry requirements and data submittals are complete and represent an accurate model of the ERCOT system
- Ensure accuracy of all constraints on transmission elements
- Ensure accuracy of TSP calculations on transmission constraints likely to be binding in SCED
- Ensure operability of redundant telemetry communication systems
- Ensure accurate representation of required data elements are properly represented in all ERCOT systems and graphical displays
- Ensure telemetry meets update performance requirements and recovery capabilities
- Ensure alarm processors indicate status changes, limit changes, and limit violations
- Ensure ability to detect forced outages through telemetry
- Ensure availability of real-time weather information required to support the DRP
- Ensure the ability to process stale telemetry at ERCOT, QSE's and TSP's
- Verify that all telemetry meets the criteria required in the Nodal Protocols

EDS2

- Trial operations of the State Estimator utilizing live data acquisition processes and calculated data as necessary
- Ensure State Estimator meets performance and availability requirements working with TSP's and QSE's to tune, correct data acquisition errors, calibrate field measurements, and correct network modeling parameters
- Trial operations of the Topology Consistency Analyzer to verify continuous telemetry of the status of Breakers and Switches in compliance with Nodal Protocols
- Trial operations of the Network Security Analysis sequence
- Validate Network Security Analysis sequence
- Validate Network Security Analysis results against real-time computations
- Trial operations of the Contingency Screening Application increasing the contingency list
- Trial operations of the Dynamic Ratings Processor
- Trial operations of the Transmission Constraint Management process

EDS3

- Ensure that QSEs can successfully submit RT resource offer curves into SCED
- Trial operations of Real-Time SCED and calculation of Resource Base Points
- Ensure reasonability of LMPs calculated by SCED
- Begin posting LMPs and other data to MIS as required in Nodal protocols
- Trial operations of RUC
- Trial operations of RT settlement functionality including RUC commitments
- Ensure proper operations of the Load Frequency Control functions
- Validate calculation of ACE accuracy against the production control system for seven days
- Testing of individual QSEs to provide Regulation control and Dispatch Instructions for manual Responsive Reserve deployment dispatch through actual deployment of regulation energy
- Verify that each QSEs ability to operate at a constant frequency as required in the Nodal Protocols
- Trial operations of the Outage Scheduling functionality
- Trial operations of the Supplemental Ancillary Services Market (SASM) procedures

EDS4

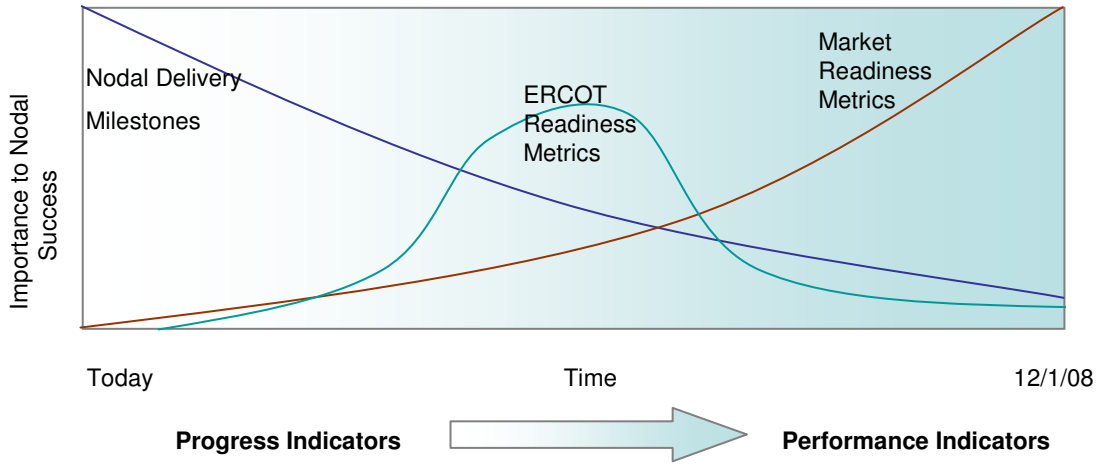
- Ensure that QSEs can successfully submit Day-Ahead resource offer curves into SCED
- Trial operations of the Day Ahead Market utilizing physical bids and offers
- Trial operations of the Day Ahead Market allowing virtual bids and offers
- Ensure the ability to procure required Ancillary Services
- Ensure reasonability of LMPs and MCPCs calculated into the DAM
- Trial Operations of DA settlement functionality including LMP and MCPC calculations
- Trial Operations of the market timeline utilizing all Day-Ahead, Real Time, and Settlement components
- Ensure system stability through a 168 hour continuous operation
- Trial operation of Daily settlement statement creation for each of the 168 hour tests
- Execute the Nodal systems in a pre-production mode with the appropriate supporting processes
- Ensure the overall Nodal business processes work properly for ERCOT to go live with the Nodal solution

Nodal success is dependent on three critical components

The success formula is stark and unforgiving…

Nodal Delivery	x	ERCOT Readiness	x	Market Participant Readiness	=	Nodal Success

NODAL PROJECT ***ERCOT STAFF*** ***MPs*** ***ALL OF US!***



…the emphasis will change over time

Metrics are designed to promote Market Readiness for 12/1/08

Goals of Readiness

- ❑ Encourage early participation
- ❑ Minimize delinquency
- ❑ Inform market of readiness declarations
- ❑ Motivational tool for the market as a whole

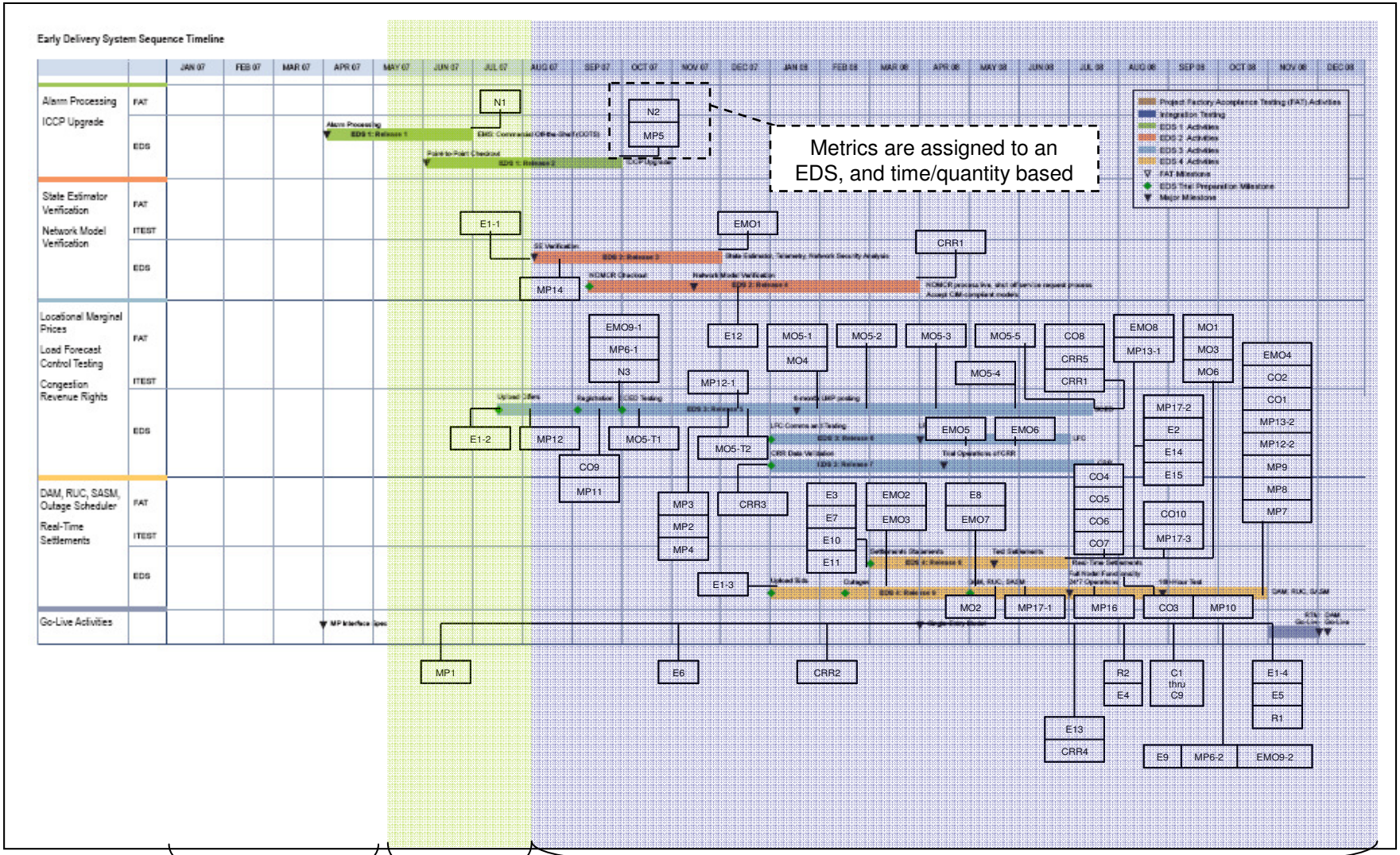
Characteristics of Metrics

- ❑ Easy to understand (unambiguous)
- ❑ Easy to calculate (reliable)
- ❑ Easy to communicate
- ❑ Incorporates Market Participant self reporting & ERCOT Observability

Timing of Metrics

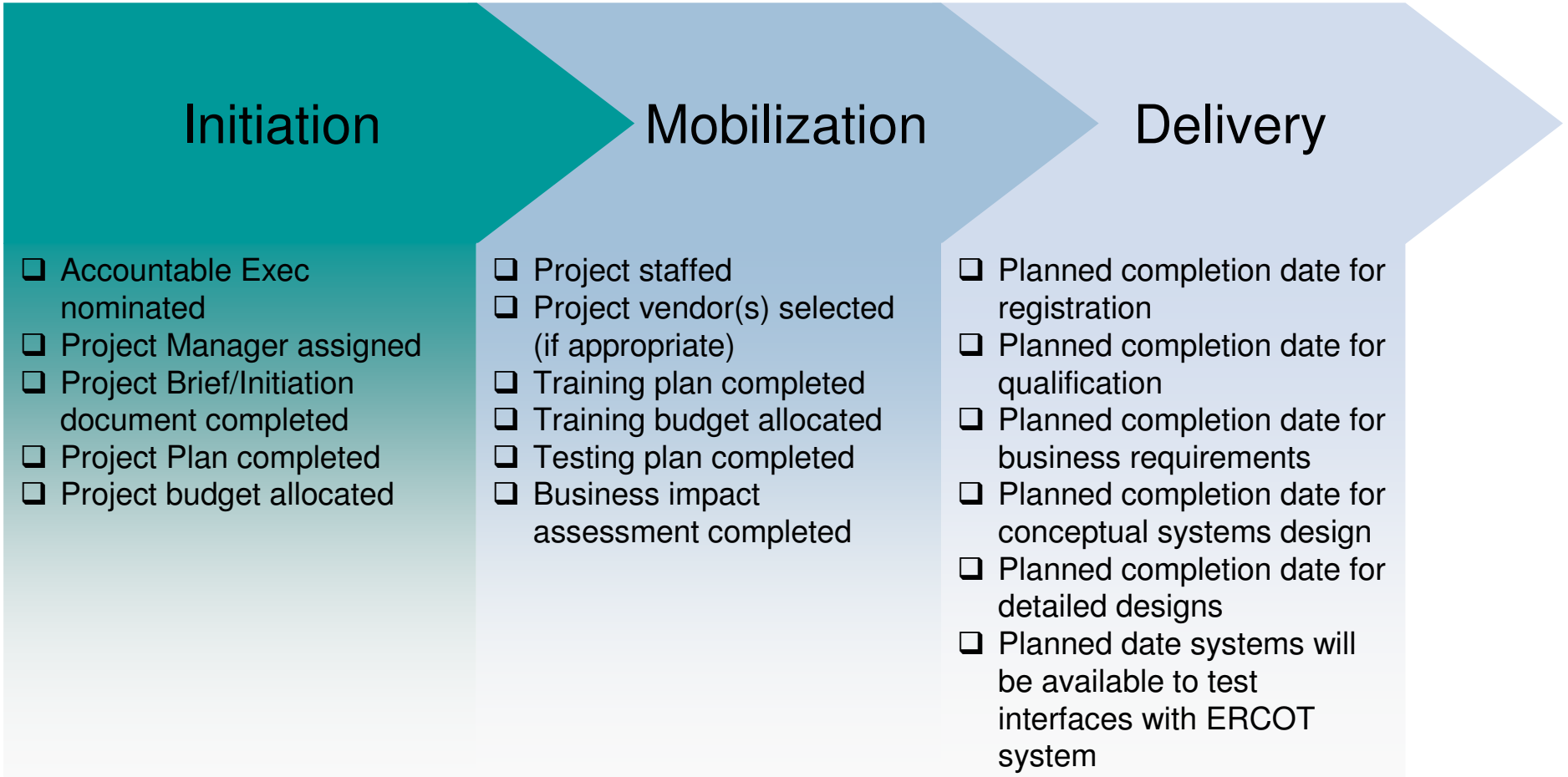
- ❑ Progressive measurement through the readiness sequence
- ❑ Forwarding looking, including lead indicators

Metric deployment is progressively dependant upon Early Delivery System Sequence Status



Measured | In measurement | Metrics known ahead of time, but measured and reported later

Example: MP Self Reporting by accountable executives – the first metrics to be deployed



…Market Participants will be asked to self report their status during each phase of the program

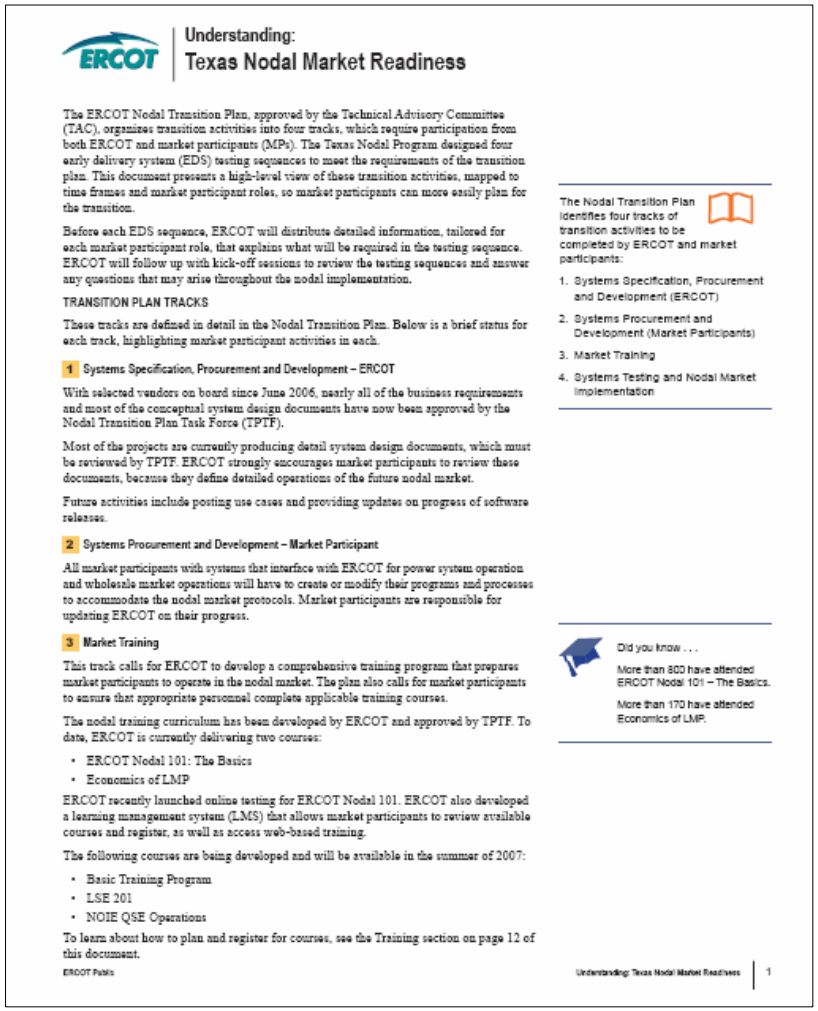
TAC role in Market Participant Readiness

- **ERCOT is suggesting that TAC be the oversight for Market Participant Readiness**
- **TPTF should be a forum for Market Participants to provide feedback on their schedule, and testing capability**
- **TPTF should work with ERCOT to adjust Market Participant testing schedule as needed**
- **TAC, with ERCOT readiness inputs, should "manage" the "Wall of Shame"**

In order for Nodal to succeed, TAC will take an active role in Market Participant Readiness

Understanding: Texas Nodal Market Readiness

Nodal Delivery X ERCOT Readiness X Market Participant Readiness = Nodal Success



ERCOT | Understanding: Texas Nodal Market Readiness

The ERCOT Nodal Transition Plan, approved by the Technical Advisory Committee (TAC), organizes transition activities into four tracks, which require participation from both ERCOT and market participants (MPs). The Texas Nodal Program designed four early delivery system (EDS) testing sequences to meet the requirements of the transition plan. This document presents a high-level view of these transition activities, mapped to time frames and market participant roles, so market participants can more easily plan for the transition.

Before each EDS sequence, ERCOT will distribute detailed information, tailored for each market participant role, that explains what will be required in the testing sequence. ERCOT will follow up with kick-off sessions to review the testing sequences and answer any questions that may arise throughout the nodal implementation.

TRANSITION PLAN TRACKS

These tracks are defined in detail in the Nodal Transition Plan. Below is a brief status for each track, highlighting market participant activities in each.

1 Systems Specification, Procurement and Development – ERCOT

With selected vendors on board since June 2006, nearly all of the business requirements and most of the conceptual system design documents have now been approved by the Nodal Transition Plan Task Force (TPTF).

Most of the projects are currently producing detail system design documents, which must be reviewed by TPTF. ERCOT strongly encourages market participants to review these documents, because they define detailed operations of the future nodal market.

Future activities include posting use cases and providing updates on progress of software releases.

2 Systems Procurement and Development – Market Participant

All market participants with systems that interface with ERCOT for power system operation and wholesale market operations will have to create or modify their programs and processes to accommodate the nodal market protocols. Market participants are responsible for updating ERCOT on their progress.

3 Market Training

This track calls for ERCOT to develop a comprehensive training program that prepares market participants to operate in the nodal market. The plan also calls for market participants to ensure that appropriate personnel complete applicable training courses.

The nodal training curriculum has been developed by ERCOT and approved by TPTF. To date, ERCOT is currently delivering two courses:

- ERCOT Nodal 101: The Basics
- Economics of LMP

ERCOT recently launched online testing for ERCOT Nodal 101. ERCOT also developed a learning management system (LMS) that allows market participants to review available courses and register, as well as access web-based training.

The following courses are being developed and will be available in the summer of 2007:

- Basic Training Program
- LSE 201
- NOIE QSE Operations

To learn about how to plan and register for courses, see the Training section on page 12 of this document.

The Nodal Transition Plan identifies four tracks of transition activities to be completed by ERCOT and market participants:

1. Systems Specification, Procurement and Development (ERCOT)
2. Systems Procurement and Development (Market Participants)
3. Market Training
4. Systems Testing and Nodal Market Implementation

Did you know . . .

More than 800 have attended ERCOT Nodal 101 – The Basics.

More than 170 have attended Economics of LMP.

ERCOT Public

Understanding: Texas Nodal Market Readiness | 1

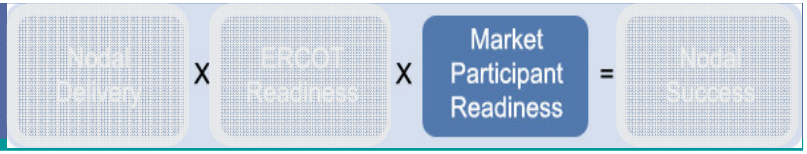
Objective:

Create a high-level overview of tasks and activities required from market participants throughout EDS sequences

- **Break out activities by market participant role**
- **Include prerequisite reading, training, registration/ qualification and testing activities**
- **Leverage design and organization for nodal website**

Distributed at Gulf Coast Power Association (GCPA) seminar, April Board meeting, Market Readiness Seminar

Nodal is engaging Market Participants directly and will seek feedback on perceptions of the program…



Market Readiness Seminar

- Market Readiness Seminar held on 4/26/2007
- Approximately 125 Accountable Executives and Project Managers attended, representing approximately 70 market participants
- Initial meeting concentrated on:
  - Nodal Overview
  - Training
  - EDS schedule and plans
  - Communications
- Agenda followed content in "Understanding: Texas Nodal Market Readiness" booklet
- Introduced high-level plan for communications throughout EDS

Nodal Surveys

- ERCOT will conduct an external survey in Q2 and an internal survey in Q3 2007
- Objective: measure perceptions from MPs and employees about confidence in ERCOT's ability to deliver
- Common core questions for both audiences, some questions tailored for specific audience types
- We will establish a baseline to measure against in future surveys
- Plan for "pulsing" surveys on website to monitor response to current events

Theme: " NO MARKET PARTICIPANT IS LEFT BEHIND"

Readiness Center

Nodal Delivery X ERCOT Readiness X Market Participant Readiness = Nodal Success

Objective:

Primary point of contact to assist with MPs' transition to nodal market. Integrated approach uses existing and new channels such as:

- **Client Services**
- **Market Notices**
- **Texas Nodal newsletter**
- **WebEx workshops**
- **Enhanced website**
- **Conference calls**
- **FAQs**

The next baseline is likely to be triggered in June to cope with further change requests…

Nodal Delivery X ERCOT Readiness X Market Participants' Readiness = Nodal Success

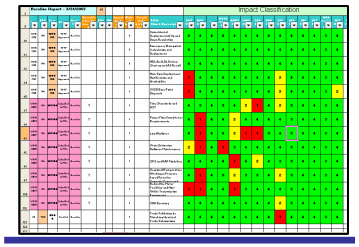
Current

Current Baseline

May 2006 Protocols

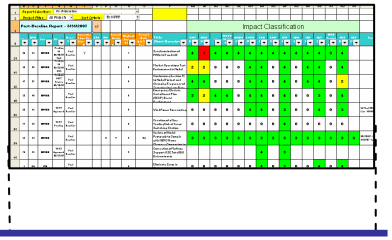
Baseline 0 (May, 2006)

Next Baseline



Baseline 1 (March, 2007)

Future Baseline



Baseline 2 (TBD)

- ❑ Update requirement documents
- ❑ Update use cases & test cases
- ❑ Update design documents
- ❑ Implement

- ❑ Enterprise level architecture impact
- ❑ Grouping items for efficiency
- ❑ Detailed cost & schedule impact
- ❑ Submit & approve Change Requests

- ❑ Evaluate whether Essential for Go-Live
- ❑ Categorize impacts in 1-4
- ❑ Approve and agree baseline scope

Baseline advance point

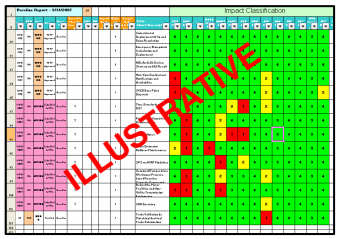
Future

Current Baseline

Baseline 0 and Approved changes from Baseline 1

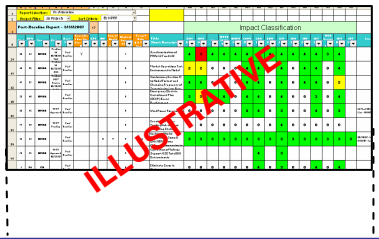
Baseline 1 (March, 2007)

Next Baseline



Baseline 2 (TBD)

Future Baseline



Baseline 3 (TBD)

Impact assessment continues for new items to get ahead for the next baseline

Proposed TAC resolution to limit additional scope change

The objective of the Nodal program is to design and implement the nodal market system and transition from the current zonal market to the nodal market by 12/1/2008.

The budget presented to the Board of Directors, TAC and TPTF was based on this timeline and the scope defined under the May 2006 version of the protocols (termed “Baseline 0”). The $263 million budget was developed using the May 2006 protocols.

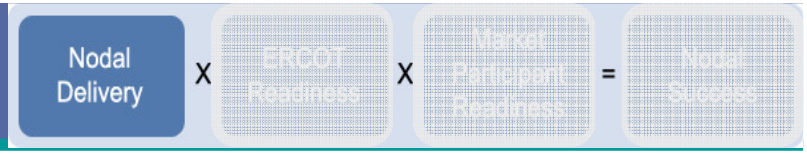
Multiple NPRRs have been approved since May 2006 and the program is currently working to incorporate them into a revised baseline (“Baseline 1”). The scope of the revised baseline includes the previous baseline plus NPRRs approved as of March 31st, 2007.

As the program continues through its delivery cycle, and the systems are built and tested, additional changes requiring additional work and rework will potentially have an exponential impact on cost and schedule.

Such changes are to be minimized. As a practical measure:

- An NPRR that is not essential for Go-Live should be deferred until after nodal goes live.
- An NPRR that addresses the correct working of the Nodal Market will be considered as essential for Go-Live.
- An NPRR that deals with adding or enhancing functionality to the existing systems will be considered not essential for Go-Live.

ERCOT will work with PRS and TPTF as to whether an NPRR is essential for Go-Live
We will work with transparency and as a team on these scope changes

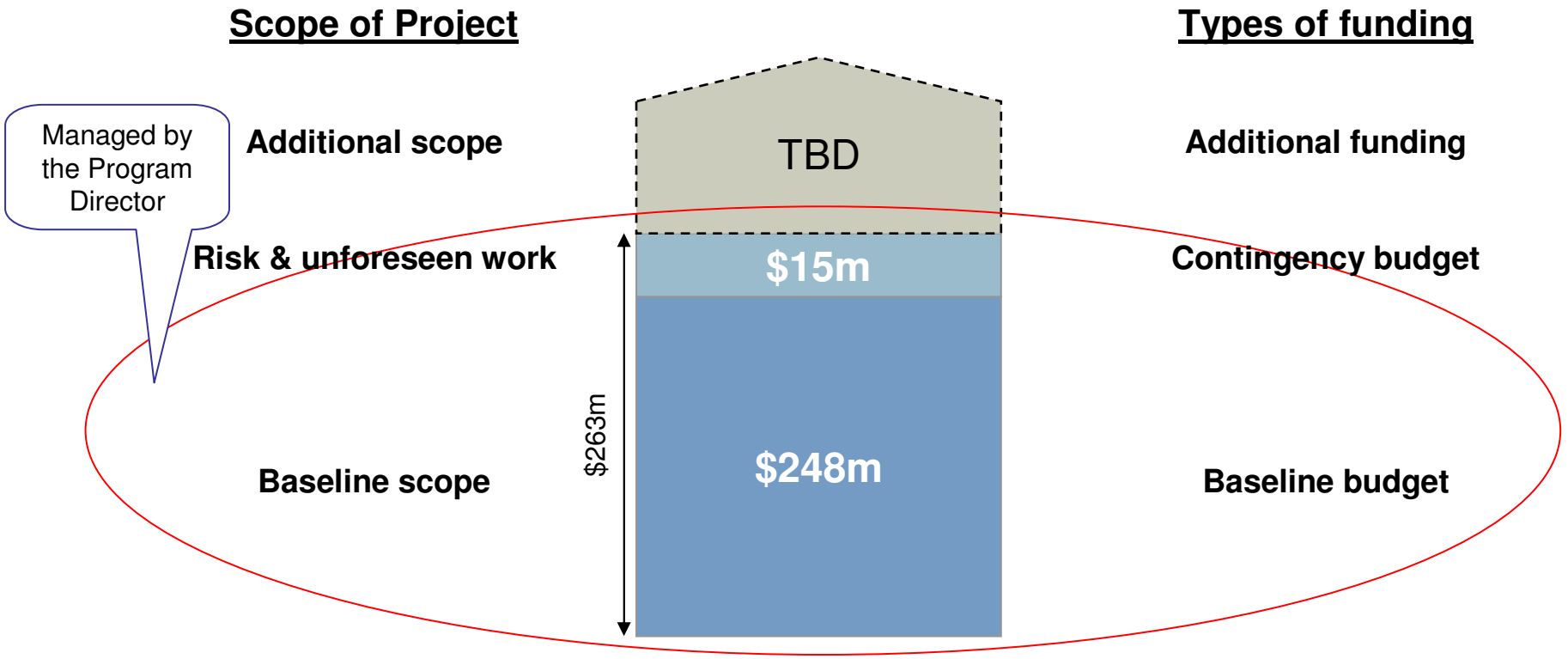


Add API Capability to CRR Project

- Change Description
  - At the December 5, 2006 TPTF meeting, a motion was passed directing the CRR team to submit a Change Request to add API (Automated Programmatic Interface) capability to the CRR system. API capability is not currently described in the Nodal Protocols or TPTF's Transition Plan document, but Market Participants have made clear their desire for ERCOT to provide the capability for all market systems.
  - This request was initially rejected by the Nodal Change Control Board on 3/7/07 as it was thought to affect the Nodal program critical path, it is additional scope, and is not a "must-have" for Go-Live.
  - After much analysis, ERCOT could adopt API and not affect the schedule.
- Cost Impact
  - Total = $693k
    - CRR internal = $400k, Enterprise Integration Project (EIP) (ERCOT Cost) = $163k, Integration Testing (INT) = $130k
  - Cost to be absorbed within current nodal budget, if possible. Nodal leadership is reviewing funding options.
- Schedule Impact
  - Added effort in CRR (2 months development time) and EIP (4 months development time) - neither effort is on the critical path of the Nodal program.
  - <u>This effort will not be allowed to impact the critical path of the program.</u> If necessary, release of this functionality will be deferred beyond Nodal Go-Live.

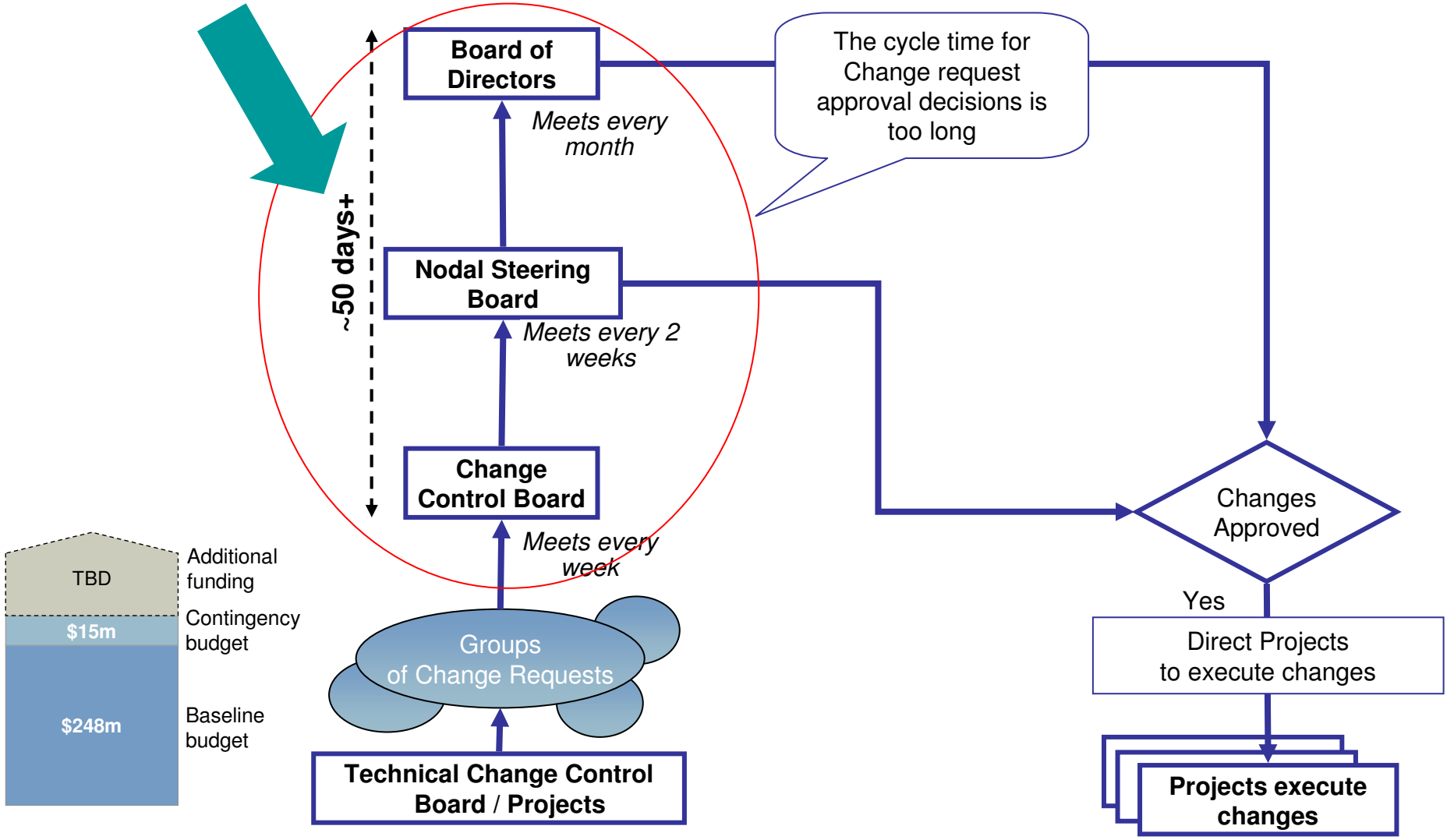
Funding and purpose

There are three different sources of changes, for which funding may be designated



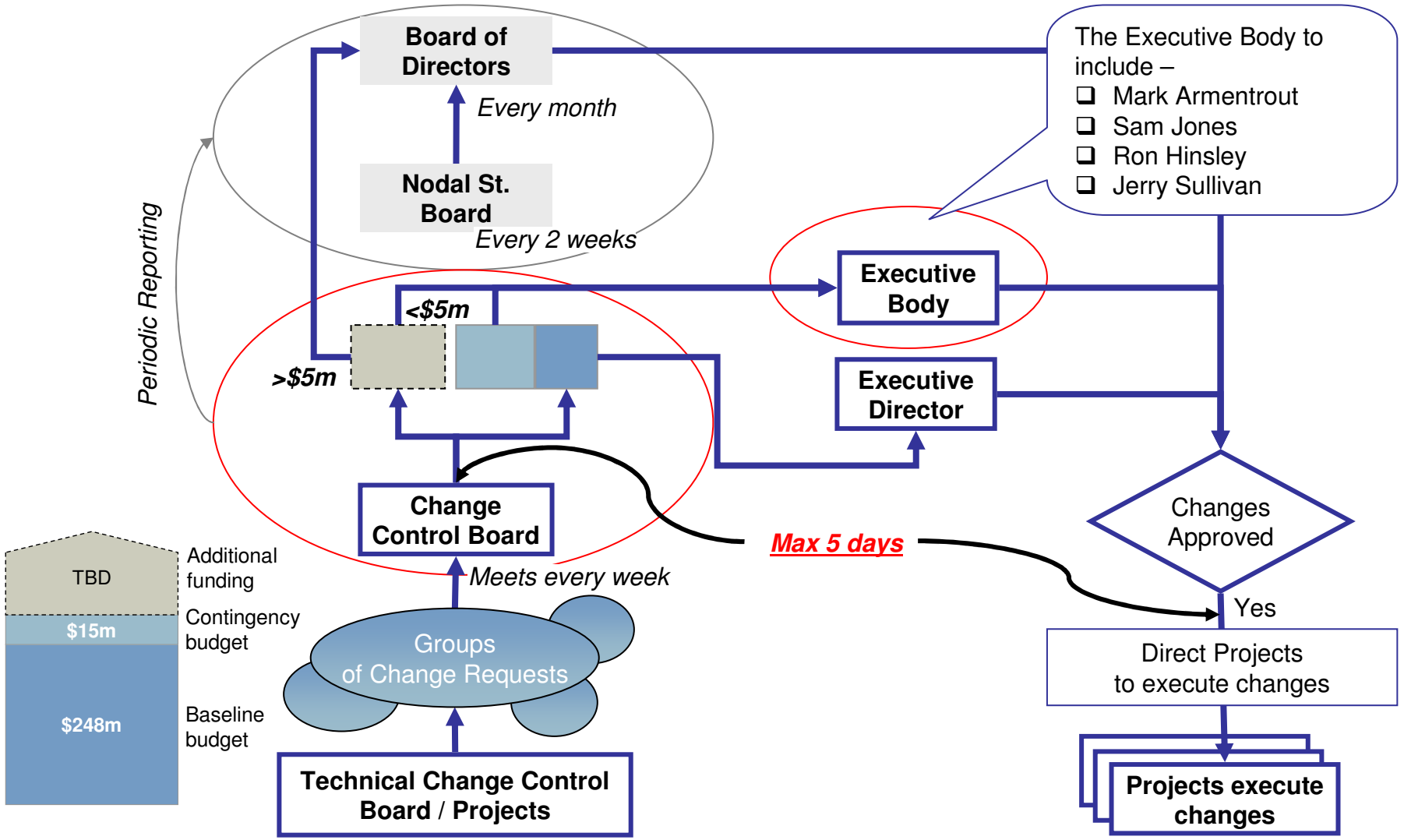
The current decision making process is a bottleneck for projects to implement changes to the baseline set in May 2006…

All changes go through a long review process.



We propose forming an executive body with an authority delegated by the board of directors to expedite the decision making process…

The proposed structure should be able to review changes and propose a resolution within 5 working days.



Nodal spending to date

We are approximately $10 million under budget to date

EXPENDITURE CATEGORY	April	Program Total
❑ O&M Expenses ($000's):		
▪ Internal Labor	32	1,800
▪ Equipment, Tools, Materials & Supplies	26	91
▪ Outside Services/Consulting	380	5,536
▪ Software license	54	284
▪ Hardware	60	309
▪ Facilities & Utilities	0	1
▪ Employee Expenses	18	55
▪ Interest and Fees	84	652
▪ Depreciation and Amortization	478	4,778
▪ Other	553	3,855
▪ Sub-Total	1,685	17,361
❑ Capital Expenditures ($000's):		
▪ Sub-Total	9,273	74,809
❑ Total Expenditures ($000's)	10,958	92,170 *
❑ Commitments		$55,584

Notes:

* Total spending through March was $81.2 MM.