DIRECT TESTIMONY OF

H. B. "TRIP" DOGGETT

SENIOR VICE PRESIDENT AND CHIEF OPERATING OFFICER

ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.

IN SUPPORT OF

ERCOT'S APPLICATION FOR APPROVAL OF A
REVISED NODAL MARKET IMPLEMENTATION SURCHARGE

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I. INTRODUCTION AND BACKGROUND

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is H. B. "Trip" Doggett. My business address is 7620 Metro Center Drive, Austin, Texas 78744.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by the Electric Reliability Council of Texas, Inc. ("ERCOT") as Senior Vice-President and Chief Operating Officer ("COO").

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS CHIEF OPERATING OFFICER.

A. The ERCOT COO is responsible for directing the Market Operations, System Operations, Compliance, and System Planning divisions, and carries out the policies and directions of the President and Chief Executive Officer.

Q. PLEASE OUTLINE YOUR EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS.

A. I am a Licensed Professional Engineer and received my Bachelor of Science degree in Engineering in 1980 from the University of North Carolina at Charlotte. Since completing my education, I have accumulated 29 years of experience in the

electric power industry. I worked for Duke Power for over fifteen years in a number of engineering and management positions. I was a manager of region engineering for Duke Power when I joined Duke Engineering & Services in 1995. At Duke Engineering & Services, I led the sub-station engineering department, provided project management services to, among others, the California Independent System Operator ("ISO"), and managed the company's marketing and business development activities.

I first began to work with ERCOT during my time with Duke Engineering & Services. As a consultant to Austin Energy, I represented that utility during the early phases of market restructuring in Texas in numerous market design working groups. In 2000, I became an independent consultant and have worked with ERCOT in that capacity until I accepted this position. As a project manager for ERCOT, I was responsible for implementing major design changes for the zonal market, and also was involved in the review of vendor documents, design documents, and draft protocols.

Q. PLEASE DESCRIBE YOUR INVOLVEMENT IN NODAL MARKET IMPLEMENTATION IN TEXAS.

A. I served as Independent Facilitator of the Texas Nodal Team, the stakeholder group that developed the Nodal Protocols. In that role, I worked with all stakeholder groups, and communicated on behalf of the Texas Nodal Team with legislators, the Commission, and ERCOT management. As a contractor to

ERCOT, I had also previously worked on the development and implementation of the Zonal Protocols. When ERCOT began implementation of the Nodal Protocols, I served as the Project Manager of the Market Engagement & Readiness project within the Texas Nodal Market Implementation Program ("Nodal Program").

In May 2008, I was chosen to serve as ERCOT's Chief Operating Officer, and assumed my duties as COO on June 1, 2008. In late January 2009, ERCOT President and Chief Executive Officer Bob Kahn asked me to become the leader of the Nodal Program on an interim basis. I continued in the interim director role until the new permanent program director, Mike Cleary, was selected.

Q. HAVE YOU EVER TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS?

A. I filed direct testimony in Docket No. 32686 (ERCOT's request for approval of the Nodal Program surcharge) in 2007, but was not called on to testify at a hearing. When I was Independent Facilitator of the Texas Nodal Team, I testified on issues related to Zonal and Nodal markets before the PUCT and committees of the Texas Legislature.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide support for ERCOT's request for approval of a revised surcharge to fund the completion of Texas Nodal.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. My testimony is organized in three parts. First, I explain what steps ERCOT took – and continues to take – to improve the Nodal Program after the announcement in May 2008 that the Nodal market would not Go-Live as planned in December 2008. Second, I discuss the development of the Roadmap to Go-Live, the "integrated program schedule" ("IPS") that the Nodal Program developed last year and has been following successfully ever since. The IPS establishes a timetable for Nodal Go-Live in December 2010. Third, I set forth the budget for completion of the Nodal Program. The total budget for Texas Nodal was set at an amount not to exceed $658.7 million, including the $353,727,603 already expended as of this filing. The Nodal Program schedule and budget described in my testimony were approved by the ERCOT Board of Directors at its meeting on February 17, 2009.[1]

II. "RESETTING" TEXAS NODAL IMPLEMENTATION AND DEVELOPING PLANS FOR ITS COMPLETION

Q. WHEN DID ERCOT DETERMINE THAT THE NODAL MARKET WOULD NOT GO-LIVE AS PREVIOUSLY SCHEDULED?

A. ERCOT President & Chief Executive Officer Bob Kahn announced that the Nodal market would not Go-Live as planned at the May 20, 2008 ERCOT Board of Directors meeting. As Mr. Kahn stated at the time, "[s]chedule is important, but

[1] The Board of Directors resolutions authorizing ERCOT's request for Commission approval of the Nodal Program schedule, budget, and revised Nodal surcharge are attached at Exhibit TD-1.

quality is number one," and ERCOT determined that the Nodal market could not meet its quality objectives and still Go-Live as scheduled.

Q. WHEN DID ERCOT BEGIN PREPARATION OF ITS REVISED SCHEDULE AND BUDGET FOR COMPLETING TEXAS NODAL?

A. The decision to delay the Nodal Go-Live date was extremely difficult, and disappointing for all involved, but once it was made, ERCOT management immediately began to investigate the causes of the delay, and to work on ways to ensure Texas Nodal's ultimate success. In June, 2008, ERCOT started replanning the schedule; work on the revised budget began in July, 2008. As it developed a revised schedule and budget, ERCOT also implemented changes intended to improve Nodal Program management and execution. The replanning efforts of the Nodal Program identified both significant strengths and weaknesses in the execution of Texas Nodal.

Q. WHAT WERE THE STRENGTHS AND WEAKNESSES OF THE NODAL PROGRAM IDENTIFIED BY ERCOT MANAGEMENT'S REVIEW OF THE NODAL PROGRAM?

A. On the positive side, the technical professionals working on the Texas Nodal software systems have succeeded in completing some of the most complex and difficult work necessary to create the market called for by the Nodal Protocols. Over 80% of the core systems – those necessary to run the grid and market after Nodal Go-Live – have been designed, developed, and delivered. While there

were significant challenges along the way, many people worked extremely hard to deliver the sophisticated software products that will be at the heart of Texas Nodal market operations. In addition, Texas Nodal has made great strides in readying ERCOT's Information Technology ("I.T.") hardware for the challenges posed by the transition to a Nodal market.

Q. WHAT ARE THE "CORE" SOFTWARE SYSTEMS NECESSARY TO RUN THE GRID AND MARKET IN THE TEXAS NODAL MARKET?

A. The "core" Nodal systems provide the foundation for the operations of the Nodal market. The core systems Texas Nodal has been responsible for designing, developing, and delivering include:

- <u>Network Model Management System ("NMMS" or "Network Model")</u>

  NMMS includes the software needed to build a Common Information Model ("CIM")-compliant database operations and planning model, and provide interface tools for incremental and bulk updates to the Operations and Planning Network Models. The project includes the software tools that are needed to build and transfer those models to the Energy Management System, Market Management System, Outage Scheduler, Congestion Revenue Rights, Management Information Systems, and registration systems.

- <u>Energy Management System ("EMS")</u>

  Texas Nodal requires that the existing EMS platform be upgraded and customized to meet specific new market redesign protocols and

requirements. These changes include a CIM-import solution to create daily real-time databases and outage-evaluation cases based on the ERCOT Network Model, and a new state estimator function that meets stringent state estimation standards and monitoring requirements. The EMS team is also developing operating and analysis tools to increase grid reliability, such as forced outage detection, outage evaluation and transmission constraint, network analysis, load-frequency control and supervisory control and data acquisition ("SCADA") improvements.

- Market Management System ("MMS")

MMS is the Nodal system used to run the day-ahead and real-time markets, reliability unit commitment, and supplemental ancillary services. It will replace the existing Zonal MMS, as required by the Nodal Protocols. MMS also includes "Market Manager," a market-user interface developed in-house. The MMS project team is also responsible for Outage Scheduler ("OS") and Independent Market Monitor ("IMM") functions. OS supports the ability to submit and manage transmission equipment and generation resource-outage requests. OS makes outage data available to other ERCOT systems, supports all outage types required by the Nodal Protocols, provides tools to manage outage life cycles, and facilitates enforcement of outage scheduling rules. The IMM functions will provide analytical tools that will enable the IMM to effectively monitor and analyze the Nodal market. The customization and complexity of the MMS project, and the fact that it has many interfaces to the multiple

systems, results in the MMS project having the largest expenditures to date among the software systems development projects.

- Congestion Revenue Rights ("CRR")

  CRR systems enable account holders to purchase rights to be charged or receive compensation for locational marginal price ("LMP") differences that arise when the ERCOT transmission grid is congested in the day-ahead or real-time markets. The CRR system is an entirely new market system that will replace the application currently in place for Zonal, known as the transmission congestion rights ("TCR") market. In the TCR market, the system allows a small number of directional products to be offered in each auction. The CRR system will dramatically change the efficiency of the market, by allowing for up to approximately 120 million products to be sold in each auction.

- Commercial Systems ("COMS")

  COMS systems deliver new functionalities in the following areas already managed by ERCOT Zonal systems: settlements and billing, commercial systems integration, financial transfer and registration/disputes. It also introduces a new area of credit monitoring management. For some functionalities, the COMS team focuses on adding new capabilities to legacy systems; in others, they are developing new settlement systems and infrastructure.

Q. HOW DID ERCOT DETERMINE THAT OVER 80% OF THE CORE SYSTEMS HAVE BEEN DELIVERED?

A. ERCOT's decision to use a "best of breed" approach to developing systems for Texas Nodal required that the program implement consistent methodologies for measuring and documenting the "lifecycle" of its software development projects. The software products that were unique to Texas Nodal had to be designed, developed, and tested before they could be incorporated into ERCOT Nodal systems. ERCOT utilized a system known as "Rational Unified Process" ("RUP") to track the design, documentation, development, and de-bugging of the massive software products created to implement Texas Nodal. By reviewing RUP documentation, identifying the functionalities the core systems can now support, and measuring progress against the work that remains to be completed, ERCOT determined that over 80% core software systems have been delivered. In addition, ERCOT is expecting the final release of MMS to begin functional acceptance testing ("FAT") shortly after the filing of this testimony.

Q. HAS THE WORK COMPLETED ON THE CORE NODAL SYSTEMS YOU HAVE DESCRIBED MOVED ERCOT CLOSER TO IMPORTANT MILESTONES IN THE COMPLETION OF TEXAS NODAL?

A. Yes. The core Nodal systems have passed several critical tests that demonstrate they will deliver the functionality necessary in the transition to a Nodal market. Most significantly, in June 2008, ERCOT successfully used Nodal systems to control the electric grid for two hours and conduct a load-frequency test. This critical test showed that the core systems are capable of performing a core

function: operating the grid reliably in place of systems designed for the Zonal market. Other key accomplishments include:

- October 2007: Texas Nodal began real-time market execution and pricing, and has been posting real-time locational market prices ever since. These capabilities enable ERCOT to provide real-time status and validation of generation and transmission data for the ERCOT region.
- March 2008: A mock auction of CRR using new Nodal systems was successfully executed.
- May 2008: Texas Nodal executed day-ahead and adjustment-period markets successfully.
- November 2008: The COMS project completed development and validated improvements required by the Nodal Protocols to the settlement and billing system (known as "Lodestar").
- November 2008: EMS reached a first-time state estimator standard, reaching the quality measure of 97% convergence in November 2008. Average convergence rates during Focused Input Testing have been consistently above 90% since that time.
- January 2009: The NMMS team transmitted a CIM-based network model to the downstream MMS and EMS systems. The downstream systems were able to import the CIM-based model's data and successfully run their own applications. This achievement marked a major step toward completion of an enterprise-integrated Nodal systems solution and makes

ERCOT the only ISO in North America to have the capabilities realized by this configuration.

There is no doubt that many challenges remain in finalizing the core systems and applications that must be completed and tested before Nodal Go-Live. The basic foundational work, however, is nearing successful completion.

Q. WERE THERE ALSO SIGNIFICANT DELAYS AND ADDITIONAL COSTS RELATED TO SOFTWARE DELIVERY?

A. Yes, most definitely. Though Texas Nodal has reached many important milestones, there have been serious challenges all along the way. In fact, delays in critical software delivery were one of the key reasons the Nodal market was not ready to Go-Live by January 2009. In particular, the development of the EMS CIM importer was much more complex than either ERCOT or its EMS software vendor, AREVA, anticipated when the Texas Nodal implementation began. The process of moving information from the "Common Information Model" into the EMS was much more complicated than anyone understood at first; the data validation necessary to properly deploy the CIM importer began late and was beset with quality problems (due to actions of both ERCOT and AREVA). Moreover, there were issues between ERCOT and its other vendors related to software development that required negotiations or workarounds – all of which also caused delays and increased costs.

Q. WHAT IS THE STATUS OF THE CIM IMPORTER SOFTWARE?

A. The CIM importer for the MMS was developed by ABB; the CIM importer for EMS was developed by AREVA. The CIM importers are now functional and were used successfully in January 2009 to move data among the core NMMS, MMS, and EMS systems.

Q. YOU STATED THAT TEXAS NODAL HAS ALSO MADE PROGRESS IN DEVELOPING THE I.T. HARDWARE AND INFRASTRUCTURE NECESSARY FOR THE NODAL TRANSITION. PLEASE EXPLAIN.

A. The Nodal market will generate enormous amounts of data that must be processed, managed, and stored by computer hardware and associated I.T. infrastructure. Keeping ERCOT prepared for the increased data capacity needs – both during the development and testing of Nodal systems and after their implementation – has been a major part of Texas Nodal's work. In fact, the expenditures on behalf of the Infrastructure project within the Nodal Program have been larger than those of any other Nodal Program project. There have been many tangible results from the efforts to improve and expand ERCOT's I.T. hardware and infrastructure. For example:

- In February 2008, Texas Nodal completed an ERCOT-wide migration of hardware, software, and data. The successful migration involved moving more than 40 terabytes of data into a new environment to support Nodal market operations. A "terabyte" is an enormous volume of data: just over one thousand megabytes ("MB") equals one gigabyte ("GB"), and just over one <u>million</u> megabytes equals a terabyte.

- Texas Nodal converted eighty (80) servers used for Zonal operations into "virtual" servers, thereby dramatically increasing data center capacity. In all, the Nodal Program has added enough data center capacity to accommodate 618 servers and virtual machines for Nodal market operations.
- The power systems and cooling systems in ERCOT's Taylor and Austin data centers have been upgraded to accommodate additional servers needed for Nodal operations.
- The Nodal Infrastructure team led the construction of a data center in Taylor that is used to host the "iTest" environment for upcoming testing activities.

Q. DO ANY OF THE SOFTWARE AND HARDWARE OBTAINED FOR NODAL IMPLEMENATION HAVE VALUE FOR ERCOT OTHER THAN AS PART OF THE NODAL TRANSITION?

A. Yes. Obviously, most of the products and services developed and delivered by the Nodal Program are focused on providing functionality for Nodal market implementation. Some of the Nodal deliverables, however, have significant value for ERCOT regardless of when or whether the Nodal market transition is completed. Examples include the Wind Forecast Service and related applications, as well as the enhanced Mid-Term Load Forecast tool, which are useful in both Zonal and Nodal contexts. Improvements in the performance of the COMS system and in I.T. hardware and infrastructure also serve ERCOT well whether

the market is Zonal or Nodal. Some general-education modules developed by Texas Nodal for ERCOT and Market Participant training would be used even if the Zonal market continued. Moreover, several of the systems delivered to date could be leveraged as stand-alone systems, with retooling of applicable interfaces to support the Zonal market (at an estimated cost of $50 million). These include the NMMS, the COMS credit-monitoring application and the OS.

Q. WHAT WERE THE SIGNIFICANT WEAKNESSES IN THE EXECUTION OF TEXAS NODAL DISCOVERED WHEN ERCOT REVIEWED THE PROGRAM?

A. As noted above, there were substantial, schedule-affecting problems with delivery of critical software products during the course of the Nodal Program. These problems were frequently addressed with vendors and within the ERCOT organization, but ultimately they resulted in delays, and in the higher human resource costs associated with keeping people working on a project for a longer period than budgeted. The root causes of the software delivery problems varied, but they did not require ERCOT to revisit the structure and practices of the Nodal Program. ERCOT's review of the overall Nodal Program in mid-2008, however, identified other issues that could be classified as systemic, and it is those problems that posed the bigger risks to the timely completion of Texas Nodal.

Q. WHAT WERE THE SYSTEMIC PROBLEMS IDENTIFIED BY ERCOT'S REVIEW OF THE NODAL PROGRAM?

A. In summary, the Nodal Program suffered from scope uncertainty and management shortcomings. The key management problems were identified after ERCOT announced the delay in Go-Live, as ERCOT worked to "reset" Texas Nodal to ensure that its revised Go-Live schedule and budget are realistic and achievable. In addition to ERCOT's internal review, the ERCOT Board of Directors formed a Special Nodal Program Committee and retained the utility consulting firm Utilicast to audit the Nodal Program. ERCOT has worked with Utilicast to identify and resolve the issues that pose risks to successful completion of Texas Nodal.

Q. PLEASE IDENTIFY THE KEY ISSUES IDENTIFIED AND WHAT ERCOT HAS DONE TO ADDRESS THEM.

A. The issues that compromised Nodal Program performance could be grouped into four broad categories. First, the Nodal Program was managed in "project silos," with insufficient centralized control and coordination. Second, a comprehensive schedule that adequately accounted for project interdependencies was not developed at the outset of the program. Third, the management controls and leadership were insufficient for a program of the scale and complexity of the Nodal transition. Fourth, system requirements were not locked down early enough, resulting in unexpected work and cost.

Q. HOW ARE THE NODAL PROGRAM'S CONSTITUENT PROJECTS ORGANIZED?

A. The overall Nodal Program is organized into project teams. This organizational structure is necessary to deploy the right subject matter expertise to particular projects, and in some ways the project-based structure has contributed to the program's successes. The Nodal Program is divided into "central" projects and "supporting" projects. The six central projects include the five projects responsible for developing the core Nodal systems described above, and the project in charge of Market Trials:

- NMMS
- EMS
- MMS (including OS and IMM functions)
- CRR
- COMS
- Early Delivery System ("EDS") a/k/a Market Trials

The Nodal Program's "supporting" projects include:

- Enterprise Integration ("EIP")
- Integration Testing ("INT")
- IT Infrastructure and Operations ("INF")
- Enterprise Data Warehouse ("EDW")
- Marketing Information System Portal ("MIS"), which includes Current Day Reports ("CDR")
- ERCOT Readiness and Transition ("ERT")
- Market Engagement and Readiness Training ("MER Training")
- Program Controls ("PC")

The activities of supporting projects change according to the needs of the overall Nodal Program. For example, we had an IDA project that was responsible for defining technical architecture and standards underlying Nodal software development during the early stages of the program that was disbanded in August 2008.

Q. WHAT DO YOU MEAN BY SAYING THE NODAL PROGRAM WAS MANAGED IN "PROJECT SILOS"?

A. While the project management strategy utilized by the Nodal Program had certain benefits, it was lacking centralized coordination. The strong motivation to get the program moving quickly to hit its Go-Live deadline led to certain management decisions and structures that emphasized the program's piece parts more than the whole program effort. This resulted in each project operating in its own "silo," with insufficient connection to and contributions from the other, interrelated Nodal projects. A lot of very good work went on in each of the project silos, but the lack of coordination between projects caused work to be omitted, inconsistently implemented, or duplicated. For example, prior to May 2008, project teams estimated their project schedules individually, without adequate program-level coordination. Project schedules varied in level of detail, dependencies on other projects, and estimation approach. In some cases, significant amounts of work had not been anticipated because one project team thought that another was doing the work, or because project leaders were not

aware of the program-level work that needed to be done (*e.g.*, establishing requirements traceability or identifying cross-project interfaces).

The area in which the compartmentalized project management approach had its most negative impact was on program integration. Texas Nodal must integrate, as Utilicast Report No. 8 summarized it, "16 new systems with 36 interfaces and 344 functional data flows."[2] The way in which the program was developed hindered ERCOT's understanding of the complexity of the integration task, and resulted in problems identified in Utilicast's Reports No. 8 and 9. ERCOT must successfully address the integration issues, which pose a serious risk to timely completion of Texas Nodal.

Q. HOW DID ERCOT RESPOND TO THESE PROBLEMS?

A. ERCOT has taken several steps to eliminate the "project silo" mentality within the Nodal Program. First, project teams were re-organized, into the "central" and "supporting" structure that is now in place. Each Project Manager of a core project now has responsibility for the upstream and downstream inter-project dependencies of his or her program. For example, the leader of the EMS project must take into account the impact of EMS systems on NMMS or other systems that will interact with EMS in the Nodal market. Project Managers must communicate with other projects and with the overall Nodal Program leadership

[2] *Id.* at 7.

to ensure they are accounting for the upstream and downstream impacts of their project's work.

Second, the Nodal Program Management Office ("PMO") was restructured in June 2008 and empowered to provide much more centralized oversight for the Nodal Program. The PMO was strengthened by adding managers with skills needed to improve Nodal Program performance. Two master schedulers were added to the PMO team with responsibility for working with the Project Managers to develop an integrated master schedule for the Nodal Program, review status reports, identify problem areas, and generate program control reports. A Requirements Practice Manager and requirements analysts were added to the team to develop a traceability strategy for the protocols and other binding documents. A Quality Assurance Practice Manager was added to ensure compliance to processes, review work products, and provide overall Nodal Program quality measures. Additionally, the Quality Assurance Practice Manager reviews external audit reports, coordinates with internal audit on audit points and ensures that all audit points are properly documented, action plans written, and tracked to closure within the assigned timeframe. A Nodal Resource Manager was added to track the use of outside labor resources, work with each Project Manager to determine dates for termination of contractors, assist with job postings and work with procurement to streamline hiring. A Communications Manager and two Communications Analysts were added to the team to work with internal ERCOT communications on the Nodal Program, to prepare presentations for various

stakeholder groups, to ensure consistent communications, and to provide internal communications briefs for the Nodal team. Finally, a Risk/Issues Manager was designated to be the owner of documenting, tracking, and reporting on risks, coordinating with the communications team to include appropriate detail and status of program level risks.

The restructured PMO played a much larger role in maintaining consistency in the way that Project Managers reported estimates of work and expense that shape the Texas Nodal schedule and budget. As ERCOT reset the program starting in June 2008, the PMO made it a high priority to ensure all managers in the program were providing consistent, trustworthy information for the overall Nodal Program planning process.

Third, ERCOT re-organized its integration efforts in line with suggestions from Utilicast. Texas Nodal created the "Nodal Enterprise Verification Project" as a team that will address the various aspects of systems integration that are so critical to timely program completion. Ms. Linda Clarke has been designated as the leader of the Nodal Enterprise Verification Project, and the Nodal Program is finalizing the organizational structure that will guide the integration efforts forward.

Q. YOU NOTED THAT "A COMPREHENSIVE SCHEDULE THAT ADEQUATELY ACCOUNTED FOR PROJECT INTERDEPENDENCIES

WAS NOT DEVELOPED AT THE OUTSET OF THE PROGRAM." PLEASE EXPLAIN HOW THIS PROBLEM DEVELOPED.

A. Utilicast noted in its "Nodal Program Oversight Report No. 8" that "[t]he Nodal Program is more complex than originally anticipated."[3] When the Nodal Program began, the people working on it sought to develop workplans that could get the enormous task complete by the scheduled Go-Live deadline of January 1, 2009. Everyone involved hit the ground running, focusing on development of the systems for which their team was responsible for delivering, and working with numerous vendor personnel to get the job done.

The early management plan did not sufficiently take into account the level of complexity involved in executing the Nodal Protocols. In particular, there was not enough attention paid to the interdependencies between the various projects. The "project silo" mentality I discussed earlier led managers to focus on their own deliverables without sufficiently taking into account the upstream and downstream impacts of their work. The schedule for getting the program to Go-Live by January 1, 2009 also relied too much on pushing each project to completion rather than on careful consideration of the projects' interfaces and the overall program's interconnectedness. There was no fully integrated schedule for program completion that took all the relevant factors into account.

[3] Utilicast Nodal Program Oversight Report No. 8: New Integrated Schedule and Budget Assessment, at 1 (Dec. 19, 2008). Utilicast Report No. 8 is filed as Exhibit TD-2 to my direct testimony.

Q. WHAT PROBLEMS RESULTED FROM THE ABSENCE OF SUCH A SCHEDULE?

A. The result was that Nodal Program management did not have sufficient visibility to fully understand the magnitude of the challenges facing program completion. A true "critical path" schedule was not in place that would guide managers in their understanding of the seriousness of delays or other setbacks in the program. Without a fully considered critical path schedule, project managers do not see some problems developing -- and other problems appear to pose much bigger threats than they actually do. In addition, schedule management was handled at the project level rather than by overall Nodal Program management. This is akin to having pilots handle air traffic control; everything might look great from one cockpit, but the best pilots are not capable of seeing the complete picture available to air traffic controllers. Reports from a Project Manager that his individual project was on track may have been accurate, but there was not enough attention paid to the ways in which project work was dependent on other projects' work, or the ways in which work within projects must be sequenced.

Q. WHAT DID ERCOT DO TO CORRECT THIS SITUATION?

A. Most importantly, the Nodal Program painstakingly developed the integrated program schedule ("IPS"). The IPS is now a visible, regularly updated, and closely monitored Roadmap to Go-Live. Led by PMO Manager Janet Ply, all Nodal Project Managers worked together to develop a schedule that takes all known interdependencies into account. The IPS includes a clearly defined critical

path, as well as tasks designated "near critical path" that are also monitored to detect schedule slippage. I will discuss the development of the IPS Roadmap later in my testimony, but it was the most important step forward in correcting management's lack of clear visibility into the program schedule. As Utilicast concluded in its Report No. 8:

> The integrated schedule includes intra-project predecessor and successor tasks and project linkages which provide a high degree of confidence that the projects are sequenced appropriately and that the critical path has been identified and can be managed. Project manager interviews confirm that the critical path items are communicated and understood and have a high level of accountability and ownership.[4]

Concurrent with the development of the IPS Roadmap, the Nodal team spent considerable time in the summer of 2008 addressing problems that had gone undetected due to the absence of an integrated schedule. This involved changes in reporting structures, mandates for increased coordination between projects, and a thorough study of where specific program tasks stood once all interdependencies had been identified. This work was challenging and time-consuming, but the Nodal PMO is to be commended for completing it in a timely manner.

The work done to correct issues last summer is paying off now as the Nodal Program consistently performs its tasks on a timely and predictable basis. Since the schedule was reset, all tasks on the Texas Nodal critical path are on schedule; of the sixteen (16) tasks on the critical path to date, the program staff have hit all

[4] *Id.*, at 9.

16. In addition, the Nodal Program has clear visibility of the status of all tasks that must be completed to reach Go-Live.

Q. WHAT ARE THE "MANAGEMENT CONTROLS AND LEADERSHIP" ISSUES ERCOT IDENTIFIED?

A. Some management issues are related to the "project silo" mentality I discussed above. In the absence of an integrated project plan, the overall leadership of the Nodal Program lacked the tools to accurately determine whether the program was on track. The overly decentralized management structure also impeded detection and correction of problems with Project Managers as they developed. Other management issues are related to the fact that the original Nodal Program schedule and budget were developed when the program was still at the conceptual level, before the project team had a complete understanding of the detailed business requirements and data flows that Nodal would require. As Utilicast notes, "[i]ndustry research indicates that projects estimated in the conceptual stage can be as much as 2 to 3 times above or below actual costs to complete."[5]

In addition, there were leadership problems at both the overall Nodal Program level and within the project teams. In some cases, individuals did not have the necessary skill sets to accomplish what Texas Nodal demanded (this appears to have been a particular problem in the integration area). In other cases, leadership and management skills came up short.

[5] *Id.*, at 7.

Q. WHAT STEPS DID ERCOT TAKE TO CORRECT THIS SITUATION?

A. ERCOT has instituted management and financial controls that are already addressing many of the shortcomings identified in the Nodal Program. In addition, there is increasing coordination on financial controls and reporting with ERCOT's Corporate Finance department, as described in Mr. Cleary's testimony. The IPS Roadmap also provides an important management tool: the roadmap enables the PMO to manage to defined, specific tasks with clear deadlines. Utilicast recognized this progress in its Report No. 8, concluding that "[t]he PMO and Nodal Finance Office have established key controls including status reporting, schedule management and cost tracking procedures. These controls provide transparency and enable timely and accurate reporting. The new controls also enable more thorough risk and issue management."[6]

Q. WHAT NEW REPORTS AND TRACKING DOCUMENTATION ARE BEING PREPARED BY THE NODAL PROGRAM?

A. We have worked with the Commission, various stakeholders, and ERCOT Board members to develop meaningful and easily understood status reports on Nodal progress. These include re-formatted reports on Texas Nodal's progress against the IPS Roadmap, reports on efforts to address documented risks, and reports on budget and spending. In addition, the Nodal PMO is developing an "earned value metric," which provides an indication of the relationship between the amounts of money spent and the work completed for each project. Once that metric is

[6] *Id.*, at 9.

complete, we expect to prepare reports that measure progress against it. All financial reports are under review to improve financial transparency, however, the new financial reports that are now being provided to the Nodal Program Committee and ERCOT Board members include:

- Budget to Actual Reports:
  - Prior month budget to actual report – without commentary
  - One month in arrears budget to actual report – with commentary
- Forecast to Actual Reports (in development):
  - Prior month forecast to actual report – without commentary
  - One month in arrears forecast to actual report – with commentary
- Project Life to Date Reports:
  - Nodal program Life to Date budget to actual report
  - Nodal program Life to Date forecast to actual report (in development)

The most recent editions of these reports, included in the Nodal Program's March, 2009 report to the Nodal Program Committee, are attached to my testimony as TD-3.

Q. HOW DID ERCOT ADDRESS THE LEADERSHIP ISSUES YOU IDENTIFIED?

A. Most recently, ERCOT followed the guidance of the Commission and its Board in hiring a "Field Marshal" for the Nodal Program. Mr. Mike Cleary, who became involved with Texas Nodal as part of Utilicast's audit team, now serves as ERCOT's Senior Vice-President and Chief Technology Officer. Mr. Cleary's

central mission is to get Texas Nodal "across the finish line" on time and within budget. He will report to both ERCOT's Chief Executive Officer and directly to the Board of Directors on Nodal issues. We are confident that Mr. Cleary will provide the leadership and management skills necessary to correct past deficiencies and implement the process improvements ERCOT is already making.

In addition, during the course of the Nodal Program, ERCOT has replaced numerous managers in an effort to improve performance. The talent pool of qualified people with an understanding of the highly technical and specialized issues that face Texas Nodal is not a large one. ERCOT must act with care when it hires and replaces people to ensure that it retains the talented people it needs, and maintains the motivation and morale necessary to successfully complete the Nodal transition. When it has been necessary to build a quality Nodal market, however, ERCOT has replaced key players at the highest levels of the program. The list of Project Managers and ERCOT executives in charge of completing Nodal looks dramatically different from the list of those in charge when the Nodal Program began. We are confident that Texas Nodal has a team in place now that will deliver, but we also understand that Nodal leadership must be held accountable if the program goes off track.

Q. THE FINAL ISSUE YOU IDENTIFIED WAS THAT SYSTEM REQUIREMENTS WERE NOT LOCKED DOWN EARLY ENOUGH. WHAT IMPACT DID THIS HAVE ON THE NODAL PROGRAM?

A. While the Nodal Protocols were adopted years ago, there also has been a steady stream of Nodal Protocol Revision Requests ("NPRRs") approved that have altered the scope of the Nodal Program. More than 160 NPRRs have been introduced since the original Nodal Protocols were approved. Most of these NPRRs were created to remove ambiguity in the Protocols however, as ERCOT CEO Bob Kahn testified in ERCOT's Nodal surcharge case in 2008, changes in scope created by NPRRs result in often difficult or expensive changes in the Nodal Program:

> [NPRRs] forced the Nodal Program to revisit requirements documentation, revise software designs, and otherwise deploy resources away from critical path items. This is not to say that adoption of NPRRs was a bad idea – in many areas the Nodal Protocol revisions will substantially improve Nodal market functionality, and in several cases ERCOT Nodal team staff instigated the changes. Whatever the rationale for their adoption, however, NPRRs affecting project scope have caused both unanticipated costs and resulted in changes to testing and implementation schedules.[7]

When Utilicast audited the Nodal Program, it identified continued scope changes as a key risk to timely completion of the Nodal market transition. Both ERCOT management and Utilicast agree that it is critical that Nodal requirements (and associated business practices and technical functionality) be "finalized and locked down."[8]

Q. HAS ERCOT TAKEN ACTION TO PREVENT ADDITIONAL CHANGES TO SYSTEM REQUIREMENTS?

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[7] Docket No. 35428, *Application of ERCOT For A Revised Nodal Market Implementation Surcharge*, Direct Testimony of Bob Kahn, at 7 (2008).

[8] Utilicast Report No. 8, at 2.

A. Yes. In mid-2008, ERCOT put into place new change control processes for the Nodal Program that required approval by the ERCOT CEO before any NPRR could take effect. Although these processes greatly reduced the amount of NPRRs that were adopted, ERCOT Staff was still required to spend a great deal of time preparing Impact Analyses for NPRRs that were proposed. At the January 14, 2009 Commission Open Meeting, the Commission expressed concerns that certain committees and groups may "somehow slow down the process" for finalizing a Nodal market. The Commission also commented that "it's about time we lock [Nodal] down … stop designing and redesigning it; we are entering a very critical phase of integration and testing, not only for ERCOT but also for Market Participants."

The Commission's discussion of the issue prompted the filing of Protocol Revision Request ("PRR") 799, which gives the ERCOT CEO more scope control over the Nodal Program in order to deliver a Nodal market within a designated schedule. PRR 799 mandates ERCOT CEO approval before NPRRs may be posted to the Market Information System. This PRR also mandates ERCOT CEO approval for System Change Requests ("SCRs") that impact system functionality for the Nodal market. This PRR also allows an appeal mechanism for the submitter of the NPRR or SCR if the ERCOT CEO's decision is to reject the NPRR or SCR. PRR 799 was adopted by the ERCOT Board of Directors at its February 17, 2009 meeting, and went into immediate effect. We are confident that PRR 799 will be of great assistance in enabling the Nodal Program to lock

down system design and requirements and focus all resources on implementation. I have attached a copy of PRR 799, as adopted by the ERCOT Board of Directors as Exhibit TD-4.

Q. DOES ERCOT NOW CONSIDER THE NODAL SCOPE "LOCKED DOWN"?

A. Yes. The Nodal Program has been proceeding based on a program scope "locked down" as of the requirements in place on December 19, 2008.

III. THE REVISED NODAL GO-LIVE SCHEDULE AND BUDGET

Q. WHAT IS THE PROPOSED DATE FOR NODAL GO-LIVE IN THE REVISED SCHEDULE APPROVED BY THE ERCOT BOARD OF DIRECTORS?

A. The resolution approved by the Board of Directors in February 2009 "authorizes completion of the Nodal Program by a date no later than December 31, 2010."[9]

Q. WHAT IS THE PROPOSED BUDGET FOR COMPLETION OF NODAL MARKET IMPLEMENTATION PROGRAM?

A. The ERCOT Board of Directors approved a budget at its February 2009 meeting that authorizes expenditures to complete the Nodal Program up to a total amount not to exceed $658.7 million. That figure was based on assumptions concerning the costs of financing that have since been revised downward, resulting in a total

[9] Exhibit TD-1 (Board Resolution approving Nodal Program schedule and budget).

proposed budget of not to exceed $643.8 million. As detailed in Mr. Byone's testimony, at its March 2009 meeting, the Board of Directors authorized ERCOT to request a Nodal surcharge amount higher than the level previously approved by the Board in February 2009. Based on the financing costs associated with the Nodal surcharge request authorized by the Board in March 2009 and incorporated in ERCOT's application in this proceeding, the budget request totaling $643.8 million consists of the following:

- Direct and indirect costs: $507.5 million;
- Contingency/Discretionary funding: $58.6 million;
- Financing costs: $77.7 million.

Q. WERE THE SCHEDULE AND BUDGET SUBJECT TO A REVIEW PROCESS BEFORE THEY WERE PRESENTED TO THE ERCOT BOARD OF DIRECTORS?

A. Yes. The schedule and budget were developed by the Texas Nodal staff in the months following the announcement of the delay in the Go-Live date. Once the Nodal staff was prepared to present the schedule and budget, it was reviewed at several levels. The ERCOT Board of Directors appointed a Special Nodal Program Committee ("NPC") to assist and advise the Board regarding Nodal Program oversight. The NPC, chaired by Board member Mr. Robert Helton, began meeting regularly in October 2008. With Board approval, the NPC retained the utility consulting firm Utilicast to review the schedule and budget proposals prepared by Nodal Program staff. The Utilicast team, over a six week period, "conducted a high level review of the Nodal Program including

objectives, plan and budget to determine if ERCOT is better positioned to successfully implement the program given the new budget and schedule."[10] Utilicast presented its conclusions in its Report No. 8, issued on December 19, 2008. The full Utilicast report is attached to my direct testimony as Exhibit TD-2.

The schedule was also reviewed by the stakeholder groups that had historically participated in Nodal Program oversight, namely the Transition Plan Task Force ("TPTF") and the Technical Advisory Committee ("TAC"). TPTF met with the Nodal Program staff on January 7, 12, 14 and 26, 2009, to discuss the revised Nodal implementation schedule. TPTF focused these discussions primarily on evaluating the impact of a December 2010 Nodal Go-Live date on Market Participant and Transmission Service Provider ("TSP") response times to scheduled project activities that require Market Participant or TSP action. The Nodal Program staff added activities and updated the ERCOT nodal schedule to reflect the concerns expressed by the TPTF membership. At the conclusion of its review, TPTF adopted a motion concluding "that the ERCOT nodal schedule, as updated, represents, with reasonable certainty, an achievable progression of Market Participant tasks and activities consistent with a December 2010 [Go-Live date]."[11] TAC considered the revised schedule at its February 5, 2009 meeting. TAC concluded that it would forward TPTF's findings to the Board of Directors

[10] Utilicast Report No. 8, at 5.

[11] TPTF Approved Meeting Minutes 2009, at 14, available at: http://ercot.com/content/committees/board/tac/tptf/keydocs/2009/approved_meeting_minutes_2009_tptf.doc.

regarding the Nodal Program schedule; TAC did not make any findings on the proposed Nodal Program budget.[12]

Q. WHEN DID THE ERCOT BOARD OF DIRECTORS CONSIDER THE PROPOSED SCHEDULE AND BUDGET?

A. The schedule and budget were presented to the Board of Directors at a special Board meeting on January 21, 2009 devoted entirely to Nodal Program issues. The Board further considered the matter at its February 17, 2009 meeting, adopting resolutions authorizing ERCOT to request approval of the schedule, budget, and associated Nodal surcharge by the Commission. At its March 17, 2009 meeting, the Board reconsidered the proposed revision to the Nodal surcharge level and adopted a resolution authorizing the surcharge request that is detailed in Mr. Byone's testimony.

Q. HOW DID NODAL PROGRAM STAFF DEVELOP THE REVISED SCHEDULE AND BUDGET?

A. As I discussed earlier in my testimony, the Texas Nodal staff devoted an enormous amount of attention to "resetting" the program schedule and budget beginning in June 2008. The determination that Nodal would not Go-Live as scheduled was the impetus for a thorough internal investigation of how to improve Nodal Program performance and develop a reasonable and achievable schedule and budget for completing Nodal implementation. As I discussed earlier

[12] TAC Minutes 20090205, at 10, draft version available at: http://ercot.com/content/meetings/tac/keydocs/2009/0305/03._DRAFT_Minutes_TAC_20090205.doc.

in my testimony, this investigation led to the discovery of deficiencies in program performance that ERCOT has worked hard to correct. In addition, however, it resulted in the development of a detailed plan for identifying and prioritizing the specific tasks that would be necessary to successfully complete the Nodal Program.

Q. DID THE "RESETTING" PROCESS BEGIN WITH DEVELOPING THE SCHEDULE OR THE BUDGET?

A. The process began with the development of the integrated program schedule ("IPS"). In order to create a meaningful budget for completing Nodal, program staff first had to develop a comprehensive understanding of the tasks that remained to be completed, and the interdependencies of those tasks within and across project teams.

A. THE INTEGRATED PROGRAM SCHEDULE ("IPS") ROADMAP TO GO-LIVE

Q. WHAT METHODS WERE USED TO TRACK OVERALL PROGRAM SCHEDULE BEFORE THE IPS WAS DEVELOPED?

A. The Nodal PMO team determined that the methods used to track overall program schedule had been inadequate and needed replacement. Prior to May 2008, the Nodal Program attempted to capture upstream and downstream project task dependencies using a spreadsheet format that did not adequately capture the necessary information. The spreadsheet was too high level to be effective in managing the Nodal Program, did not have sufficient information on cross-project

dependencies, and could not be used to truly establish the program's critical path. In addition, project teams estimated their project schedules individually, without overall program direction. Project schedules varied in level of detail and estimation approach.

Q. WHAT STEPS DID THE PROGRAM STAFF TAKE TO IMPROVE THE SCHEDULE ESTIMATION PROCESS?

A. In June 2008, the Nodal PMO began a Program-wide effort to develop a comprehensive, fully integrated schedule for completion of the Nodal Program. The PMO instituted the use of a well-established methodology frequently used in large and complex projects, known as Program Evaluation and Review Technique ("PERT"). PERT, which was devised by Booz Allen Hamilton in 1958 and has been used extensively since then, is a method used to analyze tasks involved in completing a given project, specifically the time needed to complete each task, and identifying the time needed to complete the total project. PERT estimates are arrived at by applying the following formula:

PERT = (P + 4M + O)/6, where:

1. P = Pessimistic estimate - the maximum possible time required to accomplish a task, assuming everything does not proceed as expected.

2. M = Most likely estimate - the best estimate of the time required to accomplish a task, assuming everything proceeds as normal.

3. O = Optimistic estimate - the minimum possible time required to accomplish a task, assuming everything proceeds better than is normally expected.

Use of the PERT methodology takes into account both best and worst case scenarios, together with the estimator's view of the most likely outcome in a particular situation. This estimation methodology takes into account all known risks to the performance of a given task, thus increasing confidence in the outcome. Notably, all personnel were instructed to eliminate any "contingency" time in their PERT estimates; this encouraged estimating based on actual experience and realistic expectations. By instituting PERT as the standard estimation tool, the Nodal PMO both adopted a credible and tested estimation methodology and, perhaps of equal importance, adopted a standard framework applied consistently across all projects in the Nodal Program.

In addition to the adoption of the PERT methodology, the PMO began using more sophisticated software (Microsoft Project) to track tasks on the schedule and their impacts on one another. The PMO staff provided training in the use of the Microsoft Project and PERT tools to the Nodal Program staff who would be involved in identifying tasks and estimating completion intervals. (An example of the training materials – the slide deck for the "Nodal Project Schedule Template Workshop" (June 16, 2008) – is attached to my testimony as Exhibit TD-5) We also retained two master schedulers dedicated to developing and maintaining the IPS. The two master schedulers retained by ERCOT are experienced at doing this type of work for multi-billion dollar programs.

Q. WHAT INFORMATION DID NODAL PROGRAM STAFF RELY ON TO MAKE THEIR ESTIMATES?

A. Each nodal Project Manager developed a Work Breakdown Structure ("WBS") that reflected the remaining work to be performed in their area as of June 1, 2008, based on requirements established to comply with the Nodal Protocols. Historical data for task estimation was used as a basis for re-estimating the activities in the projects. For example, extensive data was kept on subjects such as the time required for testing and software defect resolution (internally and with vendors) and for the number and types of defects. This information was used in the re-planning effort to estimate the amount of time that each project should include for testing time. Each WBS activity was estimated using PERT. The PERT process provides a set of date ranges that, once a project's critical path is identified, can be used to determine the participants' confidence level in the schedule.

Using historical data for estimation is an industry best practice. Moreover, Project Managers have a good understanding of team productivity and the types of challenges encountered by their project team. Use of historical data for estimation in addition to the PERT process provided the best Nodal project estimates that could be developed based on what was known at the time of re-planning.

After Project Managers provided estimates for each project activity, each activity was examined to determine its predecessor and successor activities. Project teams

met extensively to nail down all upstream and downstream dependencies. With assistance from the Master Schedulers retained to work with the PMO, every project task was linked to its dependent task(s) within the project as well as dependent tasks in other projects. All of these dependencies were entered into Microsoft Project in a uniform manner to ensure Program-wide consistency. For example, before the EDW project could provide a report, it needed data from the EMS project team. In this example, there would be a link that connected the dependencies of these two tasks in both the EDW and EMS project schedules. If the date slips in the EMS system to provide data, the corresponding reports that required this data would also slip, even though the report was in the EDW schedule.

Q. HOW DID THE NODAL STAFF ESTIMATE TASKS THAT ARE DEPENDENT ON VENDOR OR MARKET PARTICIPANT ACTIVITIES?

A. For vendor deliverables, ERCOT provided the requirements and specifications needed for each project to the vendor and the vendor used its own approach for estimation. Nodal Project Managers and Project Engineers reviewed vendor estimates for reasonableness and, upon agreement between vendor and Nodal Program personnel, incorporated key vendor milestones and deliverables into the appropriate project schedule.

Market Participants will play a critical role in EDS market trials and related activities running up to final testing and Go-Live. Market Participants had agreed

to a 10.5 month schedule, which had been documented in the EDS handbooks. This prior approved schedule was incorporated into the overall Nodal IPS. The ERCOT team allowed an additional 3.5 months for Market Participant re-qualification prior to starting market trials in February 2010. The dates requested by the Market Participants were preserved as requested (*e.g.*, five months for TSPs to validate their network model data, six months for settlements and billing). Nodal Program staff worked extensively with Market Participants, particularly in the TPTF meetings, to incorporate their feedback into the IPS.

Q. HOW WAS THE IPS FINALIZED?

A. During the summer and early fall of 2008, the proposed schedule was reviewed and audited repeatedly by Nodal Program staff to ensure there was an appropriate amount of time allotted for project and program activities, testing, security implementation, transition activities, and project management. Once the Nodal PMO was comfortable that project and task dependencies were fully reflected in the schedule, staff was able to define the "critical path" and "near critical path" tasks for the entire program.

Finally, PMO staff statistically calculated the confidence level in reaching Go-Live by various dates. The staff used Deltek Risk+, a comprehensive risk analysis tool that integrates with Microsoft Project to quantify the cost and schedule uncertainty associated with project plans, in conjunction with program-level PERT worksheets, to determine the confidence levels. The higher the

confidence level, the more certain it is that the given schedule point will be met. The 95% confidence schedule date was April 2011; the 75% confidence date was December 2010; the 50% confidence level was August 2010. The Nodal PMO consulted with ERCOT executives to determine which date to use as the target Go-Live date for the schedule. The ERCOT executive team and Nodal leadership agreed to use the date that reflected a 75% confidence level in the estimate. That resulted in the December 2010 Go-Live date that was ultimately approved by the ERCOT Board of Directors.

Q. WHAT BENEFITS DOES THE NODAL PROGRAM DERIVE FROM THE COMPLETION OF THE IPS?

A. The IPS provides a Roadmap that lays out in great detail how Texas Nodal will reach Go-Live by December 2010. The IPS Roadmap improves Nodal Program performance and increases confidence in the schedule several ways. First, the IPS Roadmap constitutes a single source of record for all tasks that must be performed by the Nodal Program. The schedule identifies approximately 5,400 tasks involved in getting to Go-Live, and delineates over 190 cross-project dependencies that must be taken into account by program managers. Second, the IPS Roadmap was developed using consistently applied, industry standard estimation methods that increase confidence in its accuracy.

Third, the IPS Roadmap provides ERCOT with an "early warning system" that identifies risks and problems before they become issues. The IPS gives managers

visibility into schedule slippages and their impacts on related tasks and schedules. This enables managers to take pre-emptive action to head off problems before they have cascading impacts affecting other parts of the program.

Finally, the IPS Roadmap ensures accountability. The Master Schedulers update each project schedule weekly. Because the schedule is integrated (*i.e.*, all the tasks are linked within and across projects), a slip in a task will automatically update the start and finish dates of all the tasks that are linked to it. The Master Schedulers also run weekly reports to check the critical path to see if it has been impacted by any task slips. They also run "Near Critical Path" reports to determine if any tasks that have slipped are getting close to the critical path. The scheduled task deadlines, and any changes in them, are visible to ERCOT management, so that corrective action can be taken. Progress (or lack of it) will be visible at all levels and those who are not performing to standards can be identified and taken to task.

Q. HAS THE NODAL PROGRAM PUT THE IPS ROADMAP INTO USE? IF SO, WHAT IS ITS TRACK RECORD?

A. The IPS Roadmap was developed during and refined during the summer 2008. It was "baselined" on October 24, 2008, meaning that the Nodal PMO took a snapshot of the schedule so that progress can be measured against that snapshot, or baseline. Since that time, the Nodal Program has been consistently tracking to a December 2010 Go-Live date, based on the critical path activities. As of the

March 2009 ERCOT Board meeting, of the sixteen (16) scheduled tasks and milestones on the critical path to date, the program has hit all 16.

Q. WHAT ARE THE KEY CRITICAL PATH ITEMS IN THE COMING MONTHS?

A. Currently, MMS is the project on critical path. (NMMS was on the critical path from June, 2008 until January 9, 2009). Any slips in the MMS schedule between now and August 2009 will slip the end date. The MMS team is closely monitoring ABB's delivery to ensure that there are no delays. ABB is also aware that they are under the critical path "microscope" by ERCOT and the Board of Directors.

After the final release of MMS (MMS5) is delivered, integration activities are on the critical path until market trials start in February 2010. The greatest number of dependencies is in the Nodal Enterprise Verification Project schedule, where there are dependencies across a number of projects, both interfaces and adapters as well as end-to-end testing. However, any project activities on the critical path that slip will cause a delay in the Go-Live date. Since the integration testing approach has been revamped, Nodal Program staff believes there is sufficient time in the current schedule to accommodate a satisfactory level of testing. Market trials activities through Go-Live are the final critical path activities. If Market Participants do not meet their milestones, this could also delay the Go-Live date.

There are several projects that are not far off the critical path: COMS, in particular the Credit Monitoring and Management ("CMM") is being closely monitored to ensure that slipped tasks in that project do not disrupt the critical path.

B. THE REVISED NODAL PROGRAM BUDGET

Q. HOW DID THE NODAL STAFF DEVELOP THE REVISED BUDGET?

A. The development of the revised Nodal Program budget began in August, 2008 after the Nodal staff had fleshed out the IPS Roadmap. Until all necessary tasks and their interdependencies were identified, there could not be a reliable estimate of what it would cost to complete them. The budget relied on detailed estimates from the subject matter experts within the Nodal projects, with overall program direction coming from the PMO. Similar to the schedule development process, the budget process adopted a uniform set of standards to ensure consistency throughout the Nodal Program.

When the preliminary schedule was complete, the project managers were given budgeting guidelines and program level budget assumptions. The revised budget was built on program-level activities included in the schedules. The revised budget was created over a period of two months through an iterative process consuming thousands of hours of staff time. Each project created their own budget and endured extensive reviews and changes. In addition, every ERCOT

manager with employees working on Nodal committed to provide the internal resources requested by the Nodal Program team.

Q. HOW DID THE BUDGET DEVELOPMENT STANDARDS INSTRUCT NODAL PROGRAM STAFF TO ESTIMATE THE COSTS OF THEIR WORK?

A. I have attached as Exhibit TD-6 a copy of the "Nodal Program Budgeting Guidelines" that were used to train project team members on budget development. The first admonition in the budgeting guidelines was central to the entire budgeting process: "As project budgets are being built based on the integrated schedule, keep cost-consciousness in mind and avoid any 'finish at any cost' or 'cost is no object' mentalities but build a realistic budget based on project plans and schedules and act as stewards of the ratepayers money entrusted to you."[13] All staff were instructed to develop "realistic" budgets, that neither intentionally over- or under-estimated anticipated costs of completing the Nodal Program.

Q. SINCE THE NODAL PROGRAM HAD BEEN IN PROGRESS FOR SOME TIME, DID STAFF SIMPLY EXTEND EXISTING BUDGETS INTO THE FUTURE?

A. No. The budget development process, like the schedule revision process, sought to create a forward-looking estimate based on honest and complete assessments of

[13] Exhibit TD-6, Nodal Program Budgeting Guidelines, at 1.

the work to be completed. In this respect, the PMO instructed Nodal staff as follows:

> Budgets should be built on activities identifiable in project plans and specific expenses. Simply put, if resources are required to complete tasks in the project plans, [Estimates At Completion] should represent the resources and expenses required to accomplish tasks within the project plan. This will be a 'bottom up' budget development approach – and simply extending resource timelines in the current budget until project completion will not be adequate. When preparing the budget submissions, please keep in mind and be prepared to demonstrate which resources in the EAC tie to which activities in the project plan and for what duration.[14]

The estimation process for each budget item did not include adding "contingency" funding into the cost of completing specific tasks, nor did it add in such funding at the project level. Rather, the budget process focused only on "activities identifiable in project plans and specific expenses."

Q. WERE THE BUDGET NUMBERS PREPARED BY NODAL PROGRAM STAFF CHALLENGED BY OTHERS AT ERCOT?

A. Yes. The Nodal PMO served as the first entity to challenge project estimates, followed by ERCOT executives who had Nodal Program responsibilities,, myself included. In addition, the budget was presented for review by the NPC and the entire Board of Directors.

Q. WHAT ARE THE KEY DRIVERS OF THE INCREASED DIRECT AND INDIRECT COSTS OF COMPLETING THE NODAL PROGRAM?

[14] *Id.*

A. I have attached as exhibits to my testimony several documents presented to the ERCOT Board of Directors that detail the increased costs at both the overall program and the individual project level (I list those exhibits later in my testimony.) These documents provide the detailed justification for the budget numbers adopted by the Board and presented to the Commission.

At a high level, the key drivers of the increased cost to complete Texas Nodal are the additional internal labor and external human resource costs associated with extending the completion time of the Nodal transition. The Nodal Program relies on highly specialized expertise at every stage of development, integration, and testing. To put these costs in context: 68.4 percent of the revised Nodal Program budget of $566.1 million (excluding financing costs) relates to payment of ERCOT, vendor, and independent contract resources. The extended date for Go-Live extends ERCOT's need to retain that expertise for a longer period, thus increasing overall program costs. As discussed above, ERCOT is convinced that the additional time is needed to manage integration, testing, and market trials. The additional labor and resource costs therefore are necessary to implement a quality Nodal market.

Q. WHAT IS THE REASONING BEHIND THE ADDITION OF THE "CONTINGENCY" OR "DISCRETIONARY" AMOUNT INCLUDED IN THE REVISED BUDGET?

A. The Nodal Program is hitting its targets regularly, but there are still many risks to its timely completion. Those risks are identified in Utilicast's Reports Nos. 8 and 9, and they are being addressed by the Nodal Program staff as quickly and thoroughly as possible. The large number of outstanding risks, as well as the "unknown unknowns" in a project of the complexity of Texas Nodal, makes it prudent to include in the budget a sufficient amount of funds to cover urgent needs. We need to have a budget that will support the 75% confidence level IPS Roadmap, but prudence dictates that we have sufficient budget to be able to protect the schedule. Texas Nodal has many work streams running concurrently and some will inevitably take longer than planned. When that occurs, even if the critical path is not impacted the budget would be. We must have budget to support the schedule and to be able to deal with the problems as they arise. Since the solution to such problems will most likely involve deployment of expertise that may not have been in the base budget, budget flexibility may be needed to handle such situations.

Q. WHY IS THE CONTINGENCY AMOUNT SET AT $58.6 MILLION?

A. A budget contingency of 20% is a typical standard in large projects to cover the "normal" program/project challenges. In the revised budget, Nodal Program staff determined it wiser to apply the contingency amount on a program-wide basis rather than on a project-by-project basis. In addition, it is ERCOT management's judgment that the organization should take every action possible to ensure that the revised budget is a <u>final</u> budget for the Nodal Program. ERCOT believes it wiser

to include discretionary amounts in the budget that may ultimately not be drawn down rather than have to return to Texas ratepayers for additional funding should one of the program risks – or one of the "unknown unknowns" – causes unanticipated expense that cannot be recovered from elsewhere in the base budget.

Q. WHAT CONTROLS WILL ENSURE THE DISCRETIONARY FUNDS ARE USED WISELY?

A. The ERCOT Board of Directors, rather than Nodal Program staff, will retain complete authority over the use of the discretionary funds included in the budget. At its March 2009 Board of Directors meeting, the Board adopted its "Process for Board Oversight of Discretionary Funds," which I have attached to my testimony. The Board's policy addresses both the due diligence that must be conducted before discretionary funds are drawn down for use by the Nodal Program, and when and how underspending in a budgeted category will be allocated among budgeted items or the discretionary fund.

The Board's strong financial controls over the use of the discretionary funds make those funds effectively unavailable to Project Managers unless they can make a compelling case – to the CTO, the CEO, and the Board and its Nodal Program Committee – that use of the funds is absolutely necessary. It is ERCOT's hope that the discretionary funds will not be used to get to Go-Live, thus reducing the overall cost of the program funded by the Nodal surcharge. Inclusion of the

discretionary funds in the budget, however, is a wise business decision at this stage in the Nodal Program.

Q. DOES YOUR TESTIMONY ADDRESS THE FINANCING COSTS ASSOCIATED WITH THE PROPOSED BUDGET?

A. No. The costs of financing the Nodal Program are addressed in Mr. Byone's testimony and in the Nodal Fee Filing Package materials sponsored by Mr. Petterson's testimony.

Q. WHAT ADDITIONAL EXHIBITS REGARDING THE DETAILS OF THE IPS ROADMAP AND THE NODAL PROGRAM BUDGET ARE YOU SPONSORING AS PART OF YOUR TESTIMONY?

A. In addition to the exhibits identified elsewhere in my testimony, I have included the following materials as exhibits to my testimony:

TD-7: The complete Nodal IPS Roadmap, including all task descriptions and due dates (with Gantt chart included).

TD-8: The IPS Roadmap "critical path" task list.

TD-9: The IPS Roadmap "near critical path" task list.

TD-10: Project-by-Project timeline,

TD-11: Nodal Program Revised Budget, presented by Nodal PMO at ERCOT Board of Directors meeting, February 17, 2009.

TD-12: Process for Board Oversight of Discretionary Funds, adopted at ERCOT Board of Directors meeting, March 17, 2009.

IV. CONCLUSION

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.