Item 4.3:
Operations Report (Mar & Apr 2016)

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Board of Directors Meeting

ERCOT Public
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Summary – March 2016

Operations

- The peak demand of 43,295 MW on March 31st was more than the day-ahead mid-term forecast peak of 40,360 MW of the same operating period. In addition, it was less than the March 2015 actual peak demand of 53,084 MW. The instantaneous peak load on March 31st was 43,456 MW.

- Day-ahead load forecast error for March was 2.55%.

- ERCOT issued four notifications

    - Two advisories due to postponement of the deadline for posting the DAM solution, delayed due to long solution run time and processing issues.

    - One advisory due to Physically Responsive Capability being less than 3,000 MW.

    - One advisory due to a GMD alert of K-7.

Planning Activities

- 236 active generation interconnection requests totaling 55,721 MW, including 24,197 MW of wind generation, as of March 31, 2016. The same number of requests, yet an increase of 514 MW from February 29, 2016.

- 15,929 MW wind capacity in commercial operations on March 31, 2016.
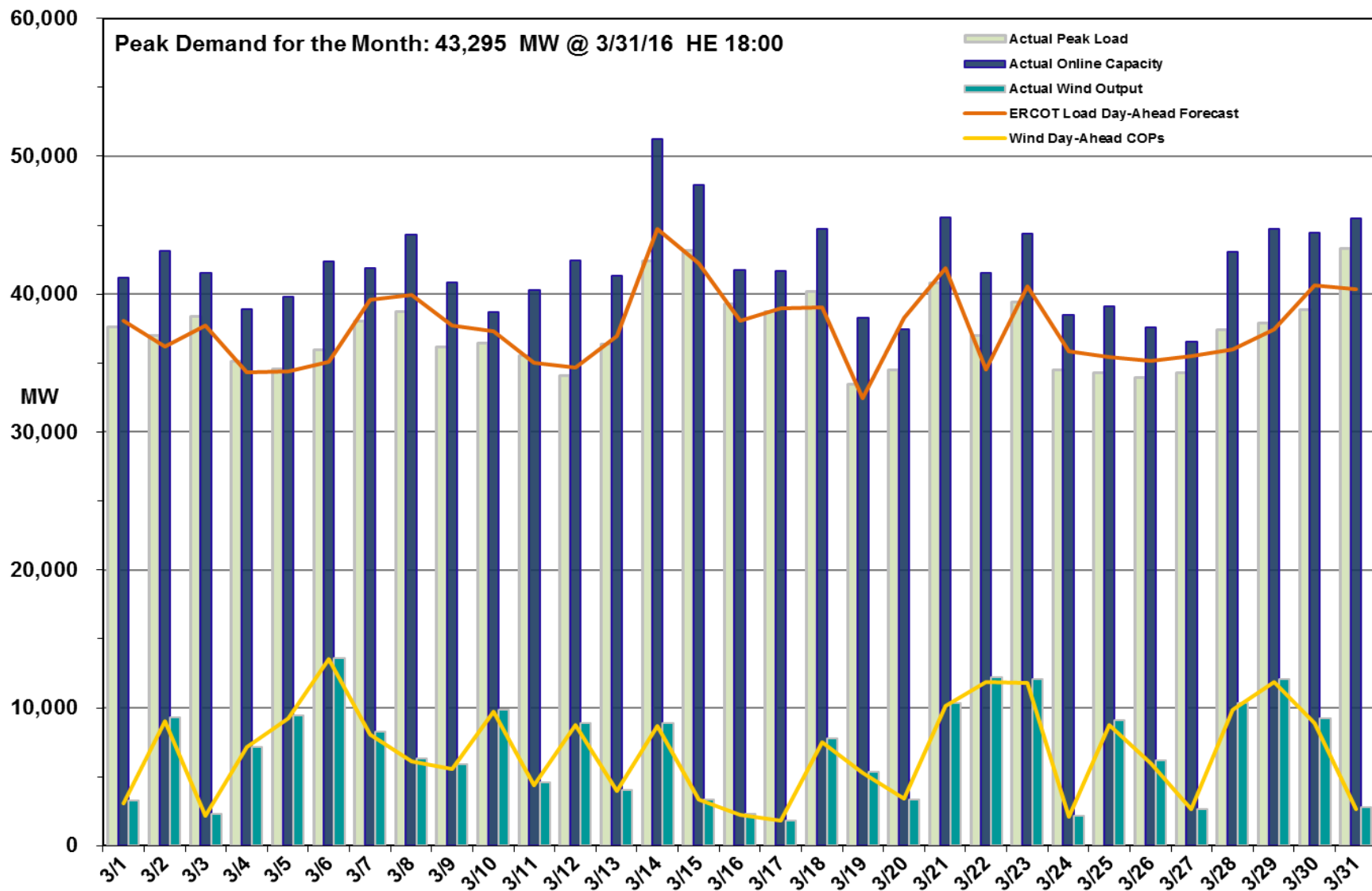
Summary – April 2016

Operations

- The peak demand of 51,036 MW on April 25th was more than the day-ahead mid-term forecast peak of 49,102 MW of the same operating period. In addition, it was greater than the April 2015 actual peak demand of 45,242 MW. The instantaneous peak load on April 25th was 51,175 MW.

- Day-ahead load forecast error for April was 2.50%.

- ERCOT issued nine notifications

  - Eight advisories due to Physically Responsive Capability being less than 3,000 MW.

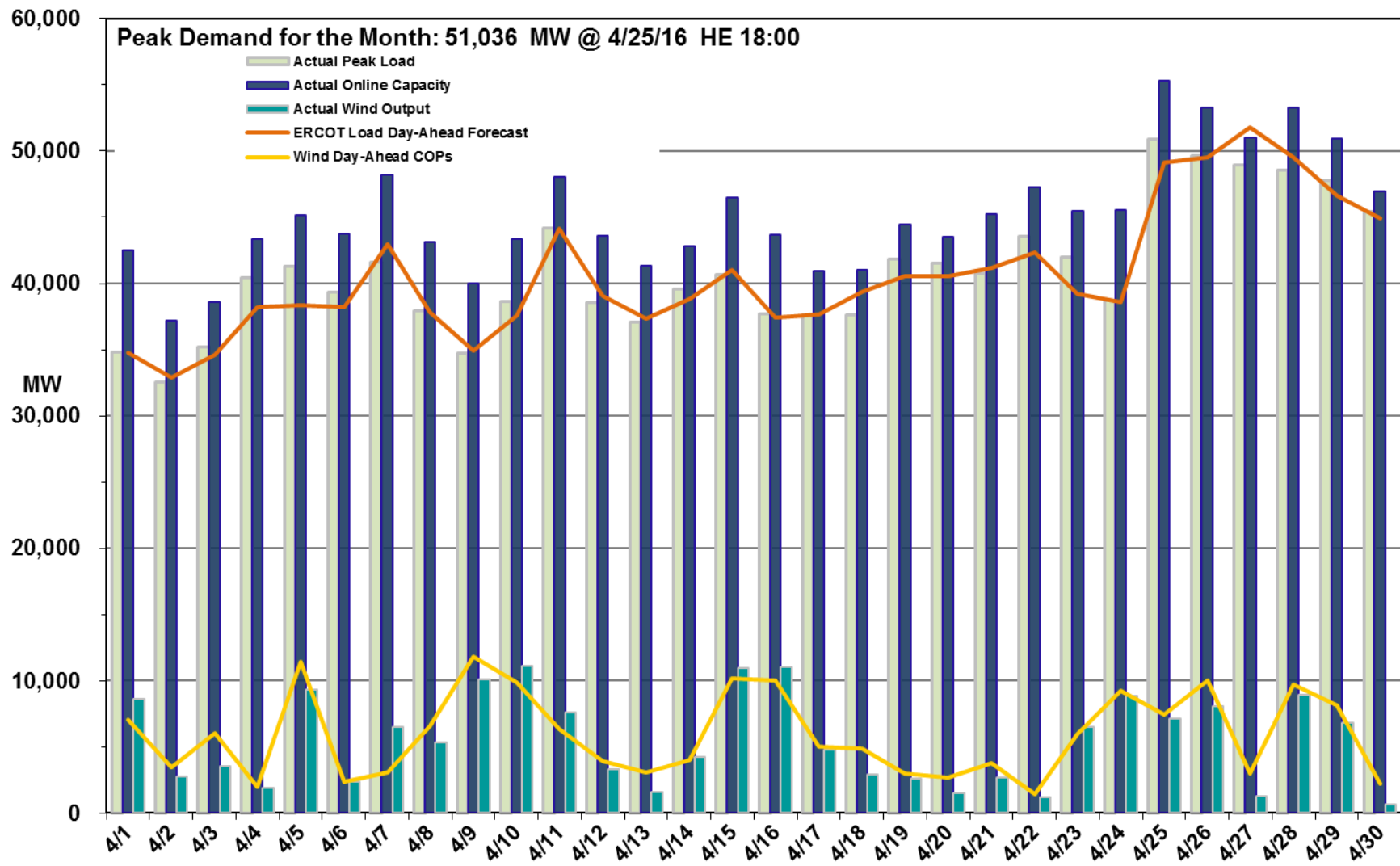 - One OCN due to a forecasted large wind down-ramp event.

Planning Activities

- 241 active generation interconnection requests totaling 56,579 MW, including 24,951 MW of wind generation, as of April 30, 2016. Five additional requests and an increase of 858 MW from March 31, 2016.

- 15,929 MW wind capacity in commercial operations on April 30, 2016.

Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs, & On-Line Capacity at Peak – March 2016

Peak Demand for the Month: 43,295 MW @ 3/31/16 HE 18:00

Legend:
- Actual Peak Load
- Actual Online Capacity
- Actual Wind Output
- ERCOT Load Day-Ahead Forecast
- Wind Day-Ahead COPs

Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs, & On-Line Capacity at Peak – April 2016

Peak Demand for the Month: 51,036 MW @ 4/25/16 HE 18:00

Legend:
- Actual Peak Load
- Actual Online Capacity
- Actual Wind Output
- ERCOT Load Day-Ahead Forecast
- Wind Day-Ahead COPs

Market Statistics – March 2016

Market Statistics	March 2015	March 2016	2015 Average	2016 YTD Average
Percentage of Real-Time load hedged in Day-Ahead Market	143.27%	129.08%	131.26%	131.65%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market ($/MWh)	27.34	17.26	28.38	17.68
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time ($/MWh)	28.59	18.81	26.05	17.54
Average East Houston Fuel Index Price ($/MMBtu)	2.70	1.68	2.57	1.93

Market Statistics – April 2016

Market Statistics	April 2015	April 2016	2015 Average	2016 YTD Average
Percentage of Real-Time load hedged in Day-Ahead Market	141.51%	118.50%	131.26%	128.36%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market ($/MWh)	24.65	19.23	28.38	18.07
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time ($/MWh)	24.32	18.24	26.05	17.71
Average East Houston Fuel Index Price ($/MMBtu)	2.56	1.86	2.57	1.91

Operational Performance Measures – March & April 2016

Performance Measure	Target Met	Further Information
Retail Transaction Performance *(Target 98%)*	*Yes*	• Retail transaction processing performance was near 100%.
Settlements Performance *(Target 99%)*	*Yes*	• 100% timely statement and invoice posting

Operational Dashboard – March & April 2016

Metric	Trending as Expected	Further Information
Day-Ahead Schedule	*Yes*	• Normal level of market activity and liquidity • Loads appear to have hedged against exposure to Real-Time prices
Day-Ahead Electricity And Ancillary Service Hourly Average Prices	*Yes*	• Hourly average prices correctly reflect the opportunity cost of energy
Day-Ahead vs Real-Time Load Zone Settlement Point Price (Hourly Average)	*Yes*	• Day-Ahead & Real-Time prices for different Load Zones reflect relative transmission congestion
Day-Ahead vs Real-Time Trading Hub Settlement Point Price (Hourly Average)	*Yes*	• The average energy price across the system reflects marginal offers and scarcity pricing impacts • Higher average Day-Ahead energy prices reflect the risk premium between Day-Ahead & Real-Time
Day-Ahead Reliability Unit (DRUC) Commitment Monthly Summary	*Yes*	• Capacity committed by the DRUC process indicates the level of out of market activity needed Day-Ahead to maintain reliability • No resource was committed in DRUC in this period

Operational Dashboard – March & April 2016

Metric	Trending as Expected	Further Information
Hourly Reliability Unit Commitment (HRUC) Monthly Summary	*Yes*	• Capacity committed by the HRUC process indicates the level of out of market activity needed during the Operating Day to maintain reliability • 6 resources in March and 10 resources in April were committed to resolve congestion
Supplemental Ancillary Service Market Monthly Summary	*Yes*	• Normal trend indicates that deliverability was not a major concern
Non-Spinning Reserve Service Deployment	*Yes*	• No Non-Spin was deployed in March • Non-Spin was deployed in April due to local congestion on 4/22 and 4/25 and low available capacity on 4/30
Congestion Revenue Rights Price Convergence	*Yes*	• Normal trend indicates good ability of market participants to estimate value of hedges

Operational Dashboard – March 2016

Metric	Trending as Expected	Further Information
Retail Transactions	*Yes*	• Seasonal variations in transaction volumes trending as expected
Advanced Metering	*Yes*	• 98.7 % of ERCOT load settled with 15-minute interval data. • 6.9M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of March 2016.
Settlement Dollars	*Yes*	• As of settlement of Operating Day 3/31/2016, the daily average settlement dollars for March are $8.68M, which is up from $6.65M in February 2016 and down from March 2015 which had an average of $9.88M.
Revenue Neutrality	*Yes*	• As of settlement of Operating Day 3/31/2016, Revenue Neutrality uplift is a charge of $6.83M, which is up from a $2.32M charge in February 2016 and up from a $2.08M charge in March 2015.
Market-Based Uplift to Load	*Yes*	• As of settlement of Operating Day 3/31/2016, the market-based uplift to load is a charge of $29.52M, as opposed to a $26.25M charge in February 2016 and a charge of $22.91M in March 2015.

Operational Dashboard – April 2016

Metric	Trending as Expected	Further Information
Retail Transactions	*Yes*	• Seasonal variations in transaction volumes trending as expected
Advanced Metering	*Yes*	• 98.8% of ERCOT load settled with 15-minute interval data. • 6.9M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of April 2016.
Settlement Dollars	*Yes*	• As of settlement of Operating Day 4/30/2016, the daily average settlement dollars for April are $8.73M, which is up from $8.68M in March 2016 and down from April 2015 which had an average of $8.76M.
Revenue Neutrality	*Yes*	• As of settlement of Operating Day 4/30/2016, Revenue Neutrality uplift is a charge of $2.75M, which is down from March 2016 which was a charge of $6.83M and up from April 2015 which was a charge of $0.97M.
Market-Based Uplift to Load	*Yes*	• As of settlement of Operating Day 04/30/2016, the market-based uplift was a charge of $18.28M, as opposed to a charge of $29.52M in March 2016 and a charge of $13.57M in April 2015.

Market Enhancements Under Consideration

Enhancement	Further Information
Future Ancillary Services (FAS)	• NPRR 667 (Ancillary Services Redesign) was posted on 11/18/2014. • Brattle presented the results from the Cost Benefit Analysis (CBA) on the FAS framework on 11/9/2015. • Full report posted on 12/21/2015. (http://www.ercot.com/content/wcm/key_documents_lists/30517/667NPRR_12a_Cost_Benefit_Analysis_122115.pdf) • Additional CBA information was presented at the 3/10/2016 PRS meeting, and both NPRR 667 and an alternative proposal, NPRR756, were discussed. • NPRR667 was rejected at the 5/12/2016 PRS meeting. • ERCOT appealed this decision to TAC, that appeal was rejected on 5/26/2016.

Multi-Interval Real-Time Market (MIRTM)	• PUC has urged ERCOT staff to work with stakeholders to evaluate feasibility of MIRTM.
	• ERCOT is working with SAWG; scope of evaluation is to:
	    • Compare efficiency, reduced production costs, with potential uplift costs.
	    • Determine the best study horizon (30 minutes, shorter, longer).
	• ERCOT has developed study software platform for the feasibility studies.
	    • Iterative process with SAWG; based on stakeholder review and feedback may modify software/data/inputs and re-evaluate.
	• Target date for completion of feasibility study is end of 2016.

Evaluating Pilot Project Feasibility	• No current pilot projects

Major Project Highlights – (as of 06/02/2016)

Project	Trending as Expected	Further Information
EMS Upgrade Program – Upgrade EMS and OTS from ALSTOM EMP 2.3 to EMP 3.0	*Yes*	• Overall Status ○ Cutover on schedule for June 16 ○ Budget forecast is favorable to the $18.9M estimate • Testing ○ Completed major defect releases needed for cutover ○ Parallel processing side-by-side comparison (old vs. new) shows expected results • Infrastructure ○ Performance improvements included with the new infrastructure • Risks ○ Defects may be found as we continue parallel testing and production verification ○ Unfavorable grid conditions on June 16th would result in rescheduled cutover ○ Potential issues during transition to new system • Operator Training ○ Upgraded Operator Training Simulator(OTS) with new EMS system ○ Operator training & Hurricane simulation completed on new Simulator • Readiness ○ Grid Operations, IT Operations, GE & ERCOT Development to be staffed for cutover activities
NMMS Upgrade Project – Replace the current Siemens NMMS application with the next generation of model management software available from Siemens	*Yes*	• NMMS Upgrade core project (the Market-facing portion) Factory Acceptance Testing (FAT) running longer than planned due to issues with the build promotion process and requested productivity improvements. The team is currently evaluating schedule and budget to mitigate impacts to the target go-live of September 2016, however, the risk potential remains high. • The Topology Processor Upgrade (the internal ERCOT portion) has begun development and is on schedule for delivery in early 2017 • Market training and education will complete a few weeks prior to the target go-live date of the core project

Major Project Highlights – (as of 06/02/2016) – continued

Project	Trending as Expected	Further Information
CIP v5 Readiness Program – Develop, modify and implement processes, procedures, workflows, and tools to ensure ERCOT's compliance with NERC CIP v5 standards	*Yes*	• NERC Critical Infrastructure Protection (CIP) Cybersecurity Standards version 5 (CIPv5) is a regulatory requirement that is effective July 1, 2016 • The overall program is managed by the Readiness Project which is on schedule and on budget • The CIPv5 process and tool enhancements are complete and continue to be verified • Internal controls and assessment testing will continue up to the effective date • NERC Audit is scheduled with TexasRE, NERC, and FERC staff for 3Q 2016
Data Center 4.0 Optimization (DC^4) Program – Replace the aging data center infrastructure with modernized infrastructure technologies to minimize the impact of failures, support future business growth, deliver highly automated next-generation infrastructure services, and ensure sustained reliability	*Yes*	• The DC^4 Program is in Planning and is tracking to the approved schedule and budget: ○ The DC^4 RFP vendor design sessions and procurement negotiations are in progress ○ The physical, logical, and future-state architecture planning is continuing ○ Application migration planning is underway for x86 systems • Other projects under the program: ○ The DC^4 Compute-DB Infrastructure Install and Migration project has successfully deployed IBM AIX Power8 hardware into DEV/TEST for Stage 1 applications ○ DC^4 Network-Core Network and DC^4 Telecom-Control Room & Grid Ops projects are in the Planning phase

Major Project Highlights – (as of 06/02/2016) – continued

Project	Trending as Expected	Further Information

Enterprise Resource Planning (ERP) – Provide a single, integrated software solution for Human Resource, Accounting/Finance, Purchasing, Asset Management and related general business planning, strategy, and reporting functions	*Yes*	• The project gated to Execution in April and is currently tracking to a target go-live to coincide with the beginning of Q4 2016. Costs are also tracking to the approved budget
		• The team is currently actively testing and validating the solution:
		  ○ Functional testing for HR and Finance workflows will complete by early June, 2016
		  ○ Integration testing across both HR, Finance and Procurement functions, as well as with vendors integrating with the ERP solution will run through the end of June
		  ○ User Acceptance Testing is scheduled to begin in July, as well as Parallel Payroll Testing
		  ○ Validation of converted and migrated data into the ERP solution will run through September
		  ○ Training for all users will begin in August and continue through September, leading up to the Q4 go-live target

NPRR219 and SCR783, Outage Scheduler Enhancements – Group 2, Usability and Filtering Enhancements – NPRR219 implements system changes that enables Resource Entities to enter outages for their Transmission Facilities in the Outage Scheduler System. SCR783 restores needed functionality that existed in the Zonal Outage Scheduler and adds functionality that Market Participants expected and needed in the Nodal Outage Scheduler	*Yes*	• Project is in Execution and tracking to approved budget and schedule • Vendor code completed earlier in the year and integration to internal components is complete. Functional testing is underway with Integration Testing to follow by early June • Instructor-led Market Training was successfully completed in May. Over 200 Market Participants attending the Outage Scheduler training in Dallas, Houston and Austin. An online training session in May was also successfully delivered. The feedback received was very positive • Project is on schedule to begin testing with Market Participants in mid-July

Appendix

The *ERCOT Monthly Operational Overview* is posted on or about the 15th of the following month to (http://www.ercot.com/committees/board/)