



Item 8.2: Operations Report (November – December 2017)

Bill Magness
President & CEO
ERCOT

Board of Directors Meeting

ERCOT Public
February 20, 2018

Summary – November 2017

Operations

- The Settlements hourly peak demand of 50,735* MW on November 5 was higher than the day-ahead mid-term load forecast peak of 48,995 MW for November 6 at Hour Ending 16.
 - The operational instantaneous peak demand was 51,2017 MW (telemetry).
- Day-ahead load forecast error for November was 2.24%
- ERCOT issued 2 notifications:
 - Two Watches issued for the Eagle Pass DC Tie due to a forced extension of a planned outage

Planning Activities

- 340 active generation interconnection requests totaling 67,915 MW, including 29,411 MW of wind generation, as of November 30, 2017. One additional requests and a decrease of 1,105 MW from October 31, 2017.
- 20,103 MW wind capacity in commercial operations as of December 1, 2017.

Summary – December 2017

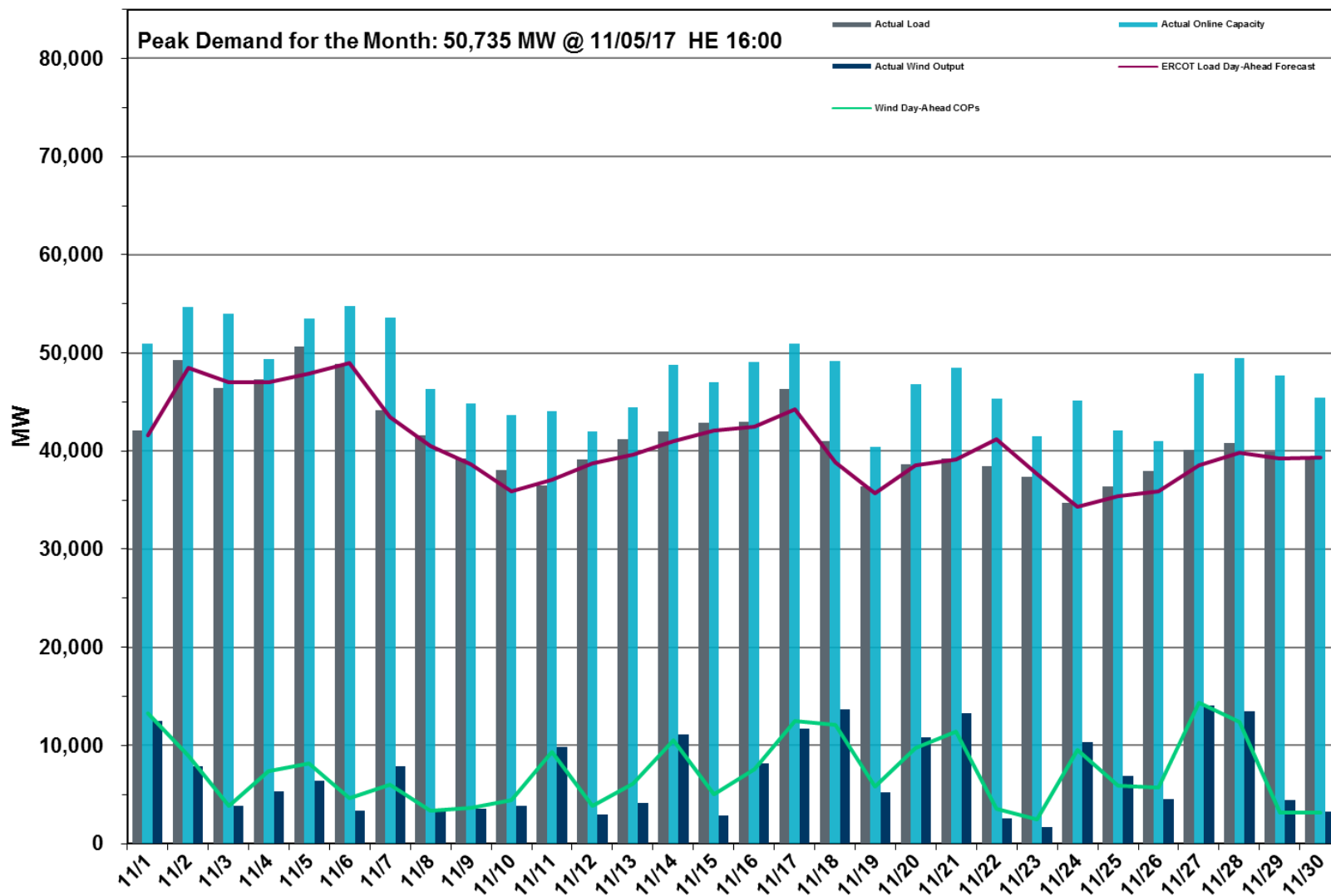
Operations

- The preliminary Settlements hourly peak demand of 54,424* MW on December 31 was higher than the day-ahead mid-term load forecast peak of 53,871 MW for December 8 at Hour Ending 8.
 - The operational instantaneous peak demand was 54,758 MW (telemetry).
- Day-ahead load forecast error for December was 3.12%
- ERCOT issued 7 notifications:
 - One OCN issued due to potential extreme cold weather system approaching ERCOT region
 - One Advisory issued due to potential extreme cold weather system approaching ERCOT region
 - One Watch issued for the Eagle Pass DC Tie due to a forced extension of a planned outage
 - One Watch issued for the Laredo DC Tie due to a forced extension of a planned outage
 - One Watch issued due to potential extreme cold weather system approaching ERCOT region
 - One Emergency issued for Far West Texas due to Voltage Stability
 - One Emergency issued due to expected cascading condition in the San Antonio Area

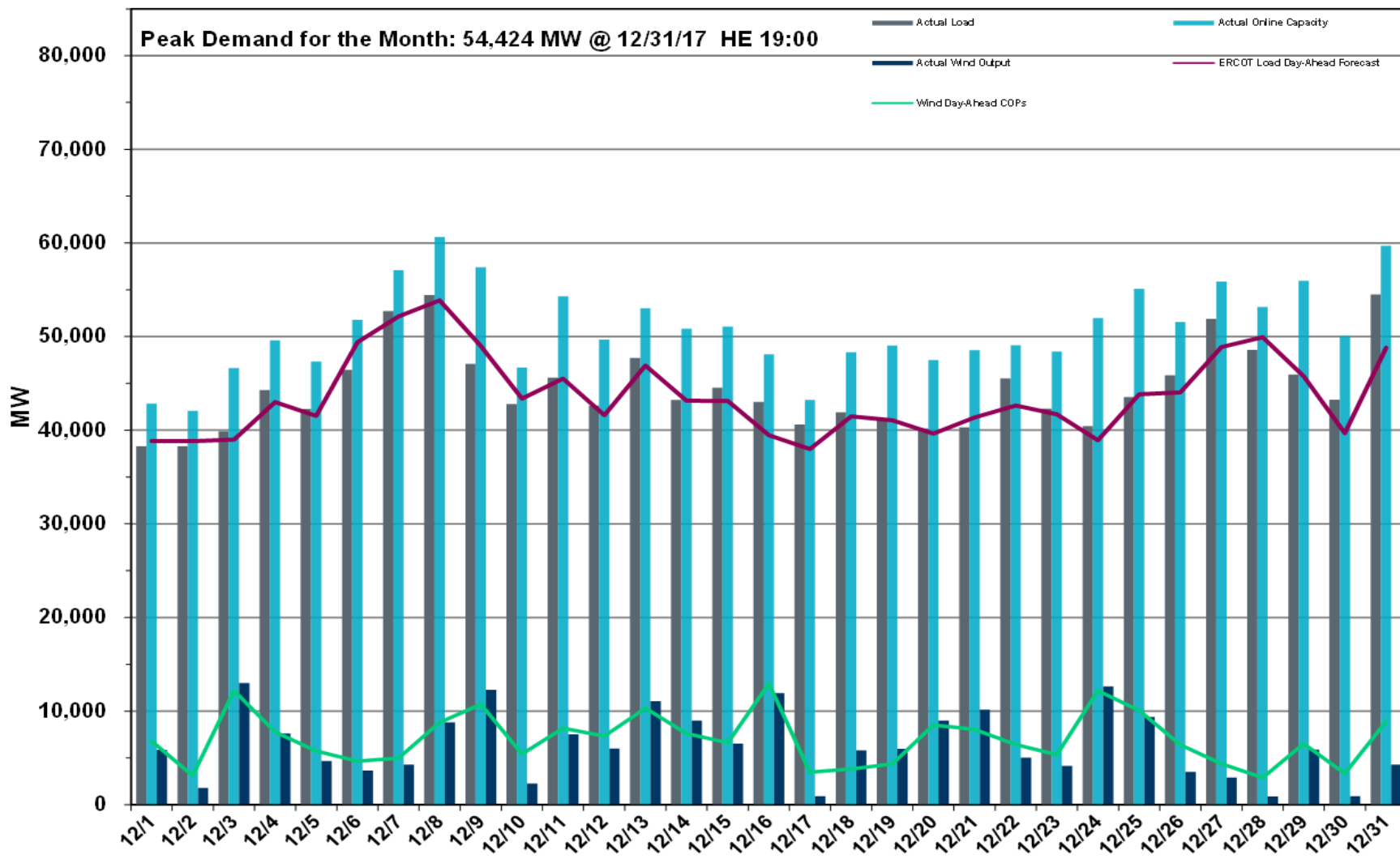
Planning Activities

- 337 active generation interconnection requests totaling 68,320 MW, including 30,198 MW of wind generation, as of December 31, 2017. Three fewer requests and an increase of 405 MW from November 30, 2017.
- 20,682 MW wind capacity in commercial operations as of January 1, 2018.

Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs & On-Line Capacity at Peak – November 2017



Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs & On-Line Capacity at Peak – December 2017



Market Statistics – November 2017

Market Statistics	November 2016	November 2017	2016 Average	2017 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	82%	77%	83%	82%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	20.19	24.00	24.56	27.07
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	22.35	22.58	23.51	26.95
Average East Houston Fuel Index Price (\$/MMBtu)	2.47	2.93	2.45	2.99

¹ The calculation method for this metric was updated in November 2017. It is now defined as the net withdraw of DAM transactions at Load Zones (including energy purchases, sales, and point-to-point transactions) by QSEs that represent physical Load, divided by the total real-time Load.

Market Statistics – December 2017

Market Statistics	December 2016	December 2017	2016 Average	2017 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	82%	79%	83%	82%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	26.47	21.64	24.56	26.63
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	23.98	22.80	23.51	26.61
Average East Houston Fuel Index Price (\$/MMBtu)	3.47	2.85	2.45	2.98

¹ The calculation method for this metric was updated in November 2017. It is now defined as the net withdraw of DAM transactions at Load Zones (including energy purchases, sales, and point-to-point transactions) by QSEs that represent physical Load, divided by the total real-time Load.

Operational Performance Measures – November & December 2017

Performance Measure	Target Met	Further Information
Retail Transaction Performance (Target 98%)	Yes	<ul style="list-style-type: none">• Retail transaction processing performance was near 100%.
Settlements Performance (Target 99%)	Yes	<ul style="list-style-type: none">• 100% timely statement and invoice posting.

Operational Dashboard – November & December 2017

Metric	Trending as Expected	Further Information
Day-Ahead Schedule	Yes	<ul style="list-style-type: none"> Normal level of market activity and liquidity Loads appear to have hedged against exposure to Real-Time prices. The calculation method for the load hedging metric was updated starting in November 2017.
Day-Ahead Electricity And Ancillary Service Hourly Average Prices	Yes	<ul style="list-style-type: none"> Hourly average prices correctly reflect the opportunity cost of energy.
Day-Ahead vs Real-Time Load Zone Settlement Point Price (Hourly Average)	Yes	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> The average energy price across the system reflects marginal offers and scarcity pricing impacts.
Day-Ahead Reliability Unit (DRUC) Commitment Monthly Summary	Yes	<ul style="list-style-type: none"> 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 – November & December 2017

Metric	Trending as Expected	Further Information
Hourly Reliability Unit Commitment (HRUC) Monthly Summary	Yes	<ul style="list-style-type: none"> Capacity committed by the HRUC process indicates the level of out of market activity needed during the Operating Day to maintain reliability. 4 resources were committed in November to resolve congestion 1 resource was committed in December to provide voltage support
Supplemental Ancillary Service Market Monthly Summary	Yes	<ul style="list-style-type: none"> Normal trend indicates that deliverability was not a major concern.
Non-Spinning Reserve Service Deployment	Yes	<ul style="list-style-type: none"> Non-Spin was deployed in December (12/8) due to local congestion.
Congestion Revenue Rights Price Convergence	No	<ul style="list-style-type: none"> In November and December CRRs continued the recent trend of having significantly higher DAM values than auction costs. Higher than-expected congestion in the Day-Ahead Market was the main driver.

Operational Dashboard – November 2017

Metric	Trending as Expected	Further Information
Retail Transactions	Yes	<ul style="list-style-type: none"> Seasonal variations in transaction volumes trending as expected
Advanced Metering	Yes	<ul style="list-style-type: none"> 98.8% of ERCOT load settled with 15-minute interval data 7.1M Advanced Metering System (AMS) Electric Service Identifier (ESIIDs) included in settlement as of November 2017.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 11/30/2017, the daily average settlement dollars for November 2017 are \$12.73M, which is down from \$15.02M in October 2017 and up from November 2016 which had an average of \$11.24M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 11/30/2017, Revenue Neutrality uplift is a charge of \$1.03M, which is down from a \$10.45M charge in October 2017 and down from a \$3.89M charge in November 2016.
Market-Based Uplift to Load	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 11/30/2017, the market-based uplift to load is a charge of \$7.84M, as opposed to a \$11.13M charge in October 2017 and a charge of \$24.65M in November 2016.

Operational Dashboard – December 2017

Metric	Trending as Expected	Further Information
Retail Transactions	Yes	<ul style="list-style-type: none"> Seasonal variations in transaction volumes trending as expected
Advanced Metering	Yes	<ul style="list-style-type: none"> 98.6% of ERCOT load settled with 15-minute interval data 7.1M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of December 2017.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 12/31/2017, the daily average settlement dollars for December are \$11.72M, which is down from \$12.73M in November 2017 and up from December 2016 which had an average of \$11.70M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 12/31/2017, Revenue Neutrality uplift is a charge of \$7.18M, which is up from November 2017 which was a charge of \$1.03M and up from December 2016 which was a charge of \$.018M.
Market-Based Uplift to Load	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 12/31/2017, the market-based uplift was a charge of \$9.19M, as opposed to a charge of \$7.84M in November 2017 and a charge of \$35.43M in December 2016.

Major Project Highlights – (as of 02/02/2018)

Project	Trending as Expected	Further Information
CRR Framework Upgrade – Improves the ability to support and maintain the CRR system by upgrading the User Interface framework and its related components to current versions	No	<ul style="list-style-type: none"> The project is in Execution and not trending to schedule and potentially, budget. ERCOT leadership convened on 12/8/2017 and determined that 1/22/2018 go-live was not feasible due to outstanding defects and production readiness activities. Delay is caused by increase time for defect resolution and retest cycles. Vendor is adding new roles to mitigate risk. The team is currently working with the vendor to address defects and to reforecast the project schedule. ERCOT will provide the market with at least 60 days' notice prior to the production release.
2015 CMM NPRRs and Tech Refresh – Combines CMM NPRRs, a technical refresh and new Treasury functionality into a single project to gain efficiencies	Yes	<ul style="list-style-type: none"> Phase 1 is in Execution and includes delivery of the CMM technical refresh along with the majority of the Credit-related NPRRs. This Phase is tracking to revised schedule and budget targets. <ul style="list-style-type: none"> Phase 1A go-live occurred on schedule with R1 2018 (February). This release delivered NPRRs 648, 683, 743, 760 and 800 via the existing CMM application. Phase 1B will continue to focus on delivery of the technical refresh along with delivery of the full scope of NPRRs in Phase 1. Development cycles continue on track and parallel FAT testing occurring in tandem. The team has confirmed a go-live date aligned with R6 2018 (December). Work on Phase 2 (Financial Transfer functionality and additional Credit/Treasury efficiencies) and Phase 3 (remaining low-priority scope) will commence after additional progress on Phase 1B development.
SCR781 RARF Replacement – Allow Market Participants to electronically submit, review, and make online changes to data ERCOT requires of them. This is the first phase of a multi-phased project approach. Phase 1 will define the overall requirements, but only focus implementation on resource asset and network modeling data collected via ERCOT's Resource Asset Registration Form (RARF)	Yes	<ul style="list-style-type: none"> The project is in Execution and tracking to schedule and budget. Business Requirements definition activities continue. Data sorting and analysis activities are scheduled for completion by 2/9/2018.

Major Project Highlights – (as of 02/02/2018) – continued

Project	Trending as Expected	Further Information
Training Facility – Construct and furnish the Training Facility. The scope of the project includes building construction, roads and walks, Landscaping, IT infrastructure, telecommunications and furnishings	Yes	<ul style="list-style-type: none"> The project is in Execution and tracking to approved schedule and budget. Excavations and foundations work is in progress. Working with Building Architect and 3rd party vendors to finalize interior finishes.
Identity & Access Management – Replaces the current identity and access management (IAM) system, improving access control and the user experience	Yes	<ul style="list-style-type: none"> The project is in Planning Phase 2 and is tracking to approved schedule and budget. <ul style="list-style-type: none"> Infrastructure build out is in progress. Software development and unit testing is on track. Integration with Oracle and SQL databases in progress. Integration with Workday and internal systems on track. Data collection from departments for new roles and access is in progress.
IT Change and Configuration Management Phase 2 –Identify and address critical improvements of the initial IT Change and Configuration Management implementations to increase throughput, reduce complexity, and fulfill support for the remainder of ERCOT's non-NERC classified systems	No	<ul style="list-style-type: none"> Project is in the Execution Phase and is not tracking to the approved budget and schedule. Delay is caused by a data intensive application that needs to be modeled and recorded correctly, so reports give valuable information. Data integration work was also underestimated. Resources have been focusing on ensuring the baseline data is accurate and can be accessed through integration. Additional resources have been added in project management, data collection, testing and operational readiness areas. The team is currently reviewing remaining work and schedule to determine the additional time and budget required to complete the project. Major milestones: <ul style="list-style-type: none"> Cutover of the uCMDB completed on 1/29/2018, as planned ITCM Iteration 8 Infrastructure and Plugin Admin UI work streams in progress. Completed Iteration 7 automation testing as planned Integration of the plugin for the population of assets from the staging database is in progress Completed NCAR, NERC, Baseline Comparison, Platform Owner Prototype Specs and NCAR Prototype report

Major Project Highlights – (as of 02/02/2018) – continued

Project	Trending as Expected	Further Information
Data Center 4.0 Optimization (DC4) 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	<p>The remaining active DC4 projects are tracking to the approved schedule and budget:</p> <ul style="list-style-type: none"> • Telecom-Control Room & Grid Ops Project (Execution) – Procurement of the Control Room phone, recorder, and hotline systems has been completed. Build and delivery requests are being processed. Go-Live at the end of March. • Network-Command & Control Project – includes the purchase and deployments of network load balancing appliances, network logging systems, and a network analysis tool: <ul style="list-style-type: none"> ◦ Stage 1 (Closing) – the load balancing solution has been deployed for the global network. ◦ Stage 2 (Execution) – New network logging solution has been delivered. Training is scheduled, and the deployed of the logging system is planned for end of May. ◦ Stage 3 (Execution) – Procurement of a new network analysis tool has been completed. Training is scheduled, and deployment of the network analysis system is planned for end of June. The local network load balancing solution deployment has been scheduled for Q4 2018. • Application Migration Project – an eight stage migration project, where application and databases from legacy systems are migrated to the new converged infrastructure systems: <ul style="list-style-type: none"> ◦ Stage 1 (Closing) – virtual-to-virtual (V2V) system migrations for this stage have been completed. ◦ Stage 2 (Closing) – physical-to-virtual (P2V) system migrations for this stage have been completed. ◦ Stage 3 (Execution) – application migrations that require IP address changes under this stage have been completed. Systems are in stabilization and then moving this stage to Closing. ◦ Stage 4 (Execution) – SQL database cluster builds, with their associated database migrations, are 78% complete. ◦ Stage 5 (Execution) – systems that require a new (fresh) build on the converged infrastructure are in planning. ◦ Stage 7 (Execution) – network attached storage file system migrations are 98% complete. ◦ Stage 8 (Execution) – remaining project migrations that are not part of the first 7 stages are scheduled, and these migrations are 55% complete. ◦ Overall, 85% of the these applications are now running on the new converged infrastructure.

Major Project Highlights – (as of 02/02/2018) – continued

Project	Trending as Expected	Further Information
Data Center 4.0 Optimization (DC4) 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	<p>The remaining active DC4 projects are tracking to the approved schedule and budget:</p> <ul style="list-style-type: none"> Storage-DB Install and Migration – includes the purchase and deployment of database storage hardware and the migration of databases and file systems: <ul style="list-style-type: none"> Stage 1 (Execution) – All new database storage, backup database appliances, and upgrades to the existing tape backup system have been deployed. Moving this stage to Closing. Stage 2 (Execution) – migrations of all databases and files systems are complete, with storage hardware decommissions underway. Remote Access (Execution) – The remote access production builds are complete and testing of new production remote access system is underway. Production cutover scheduled for end of March. Telecom-Corporate Voice System – includes the purchase and deployment of the voice firewall systems and the enterprise voice over IP solution: <ul style="list-style-type: none"> Stage 1 (Execution) – Procurement of the voice firewall systems is complete. Scheduling deployment of this hardware in March. Stage 2 (Not Started) – This stage will begin planning in March. Telecom-Data Center Connectivity (Execution) – Procurement of the replacement hardware responsible for connecting the fiber channel network between data centers is underway, with the completion expected in mid-March.

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