



Item 4.2: Operations Report (January – February 2018)

Bill Magness
President & CEO
ERCOT

Board of Directors Meeting

ERCOT Public
April 10, 2018

Summary – January 2018

Operations

- The preliminary Settlements hourly peak demand of 65,750* MW on January 17 was lower than the day-ahead mid-term load forecast peak of 68,542 MW for same operating hour.
 - The operational instantaneous peak demand was 66,065 MW (telemetry).
- Day-ahead load forecast error for January was 3.37%
- 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 due to potential extreme cold weather system approaching ERCOT region
 - One Watch issued due to freezing precipitation in the San Antonio and Houston areas
 - One Advisory issued due to loss of ERCOT's RTCA and State Estimator for greater than 15 minutes
 - One Watch issued due to DRUC not completing by 1800
 - One Watch issued due to Eagle Pass DC Tie Outage extension

Planning Activities

- 335 active generation interconnection requests totaling 66,927 MW, including 31,420 MW of wind generation, as of January 31, 2018. Two fewer requests and a decrease of 1,393 MW from December 31, 2017.
- 20,693 MW wind capacity in commercial operations as of February 1, 2018.

Summary – February 2018

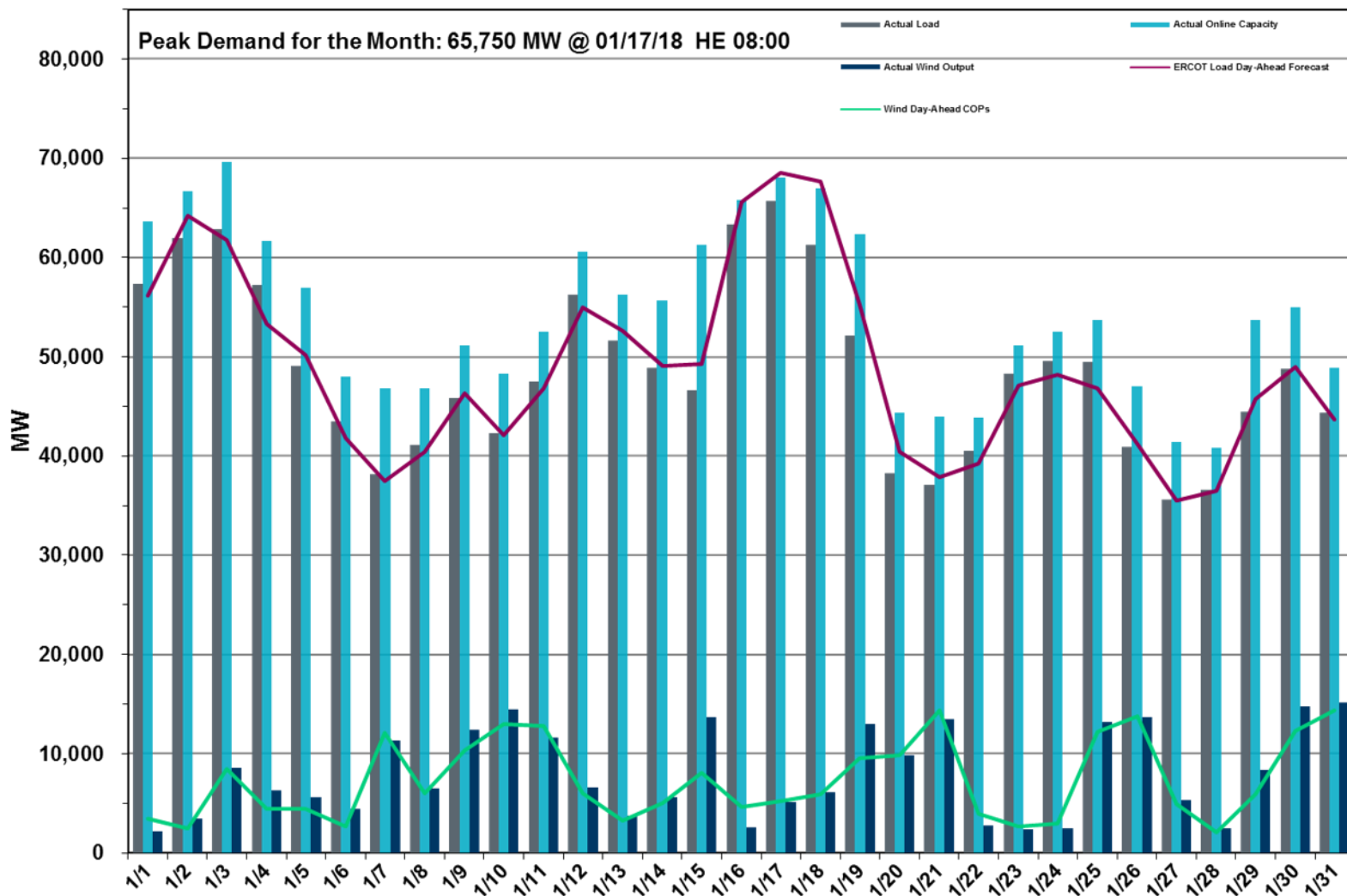
Operations

- The preliminary Settlements hourly peak demand of 55,150* MW on February 12 was higher than the day-ahead mid-term load forecast peak of 54,181 MW for same operating hour.
 - The operational instantaneous peak demand was 55,933 MW (telemetry).
- Day-ahead load forecast error for February was 3.66%
- ERCOT issued 1 notification:
 - One Watch issued for Railroad DC Tie due to minimum bandwidth allowance of 15MW

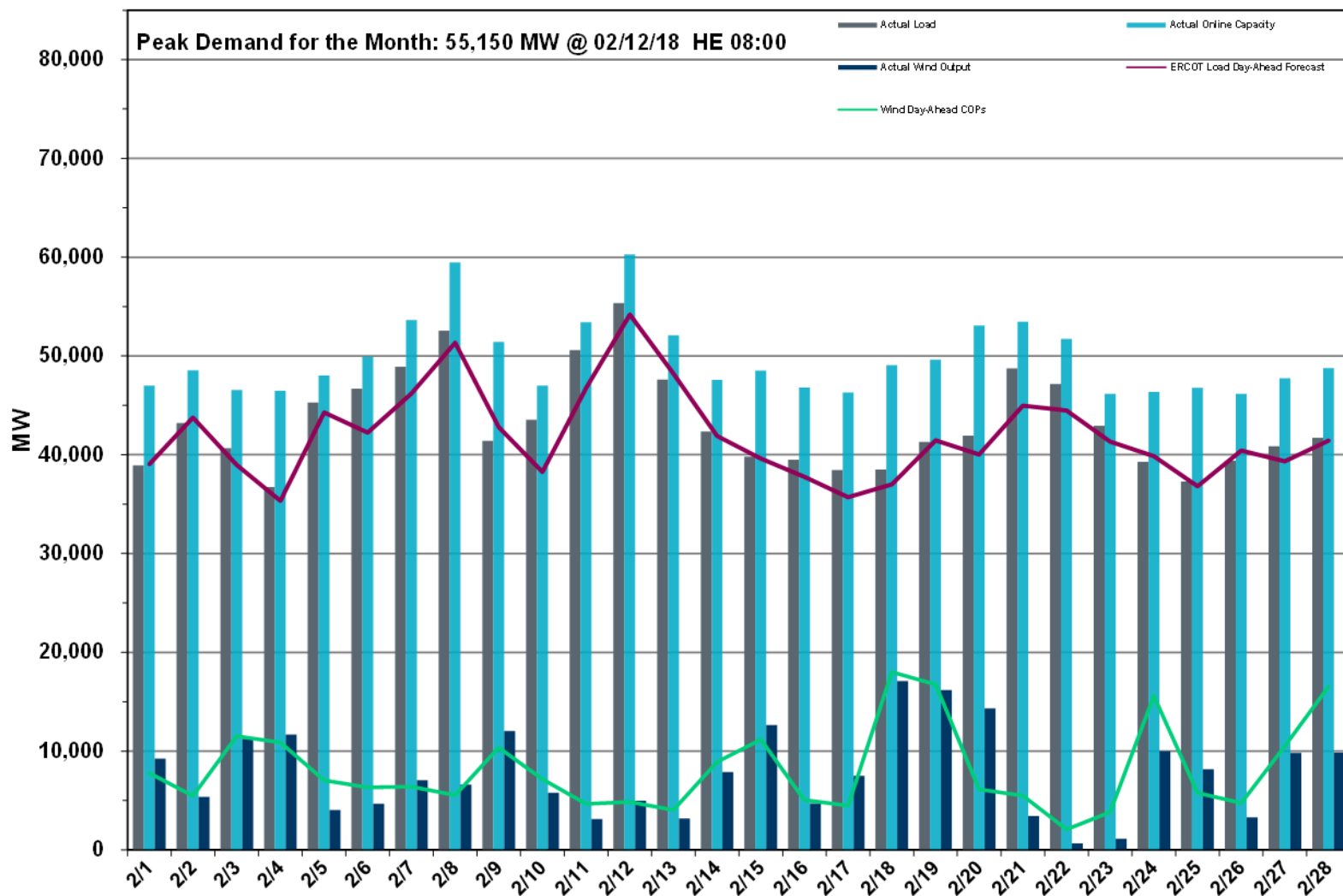
Planning Activities

- 334 active generation interconnection requests totaling 67,398 MW, including 32,258 MW of wind generation, as of February 28, 2018. One fewer requests and an increase of 471 MW from January 31, 2017.
- 20,890 MW wind capacity in commercial operations as of March 1, 2018.

Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs & On-Line Capacity at Peak – January 2018



Daily Peak Demand: Hourly Average Actual vs. Forecast, Wind Day-Ahead COPs & On-Line Capacity at Peak – February 2018



Market Statistics – January 2018

Market Statistics	January 2017	January 2018	2017 Average	2018 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	84%	82%	82%	82%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	24.09	43.55	26.63	43.55
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	24.87	38.80	26.61	38.80
Average East Houston Fuel Index Price (\$/MMBtu)	3.22	4.23	2.98	4.23

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 – February 2018

Market Statistics	February 2017	February 2018	2017 Average	2018 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	84%	78%	82%	80%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	20.97	22.49	26.63	34.00
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	20.55	24.65	26.61	32.39
Average East Houston Fuel Index Price (\$/MMBtu)	2.78	2.63	2.98	3.47

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 – January & February 2018

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 – January & February 2018

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 resources were committed in DRUC in this period.

Operational Dashboard – January & February 2018

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. Four resources were committed in January to resolve congestion. No resources were committed in February.
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 January (1/23/2018) due to significant load ramp and projected need for Ancillary Service capacity.
Congestion Revenue Rights Price Convergence	No	<ul style="list-style-type: none"> CRRs continued the recent trend of having significantly higher DAM values than auction costs, particularly for January. Higher than-expected congestion in the Day-Ahead Market was the main driver.

Operational Dashboard – January 2018

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"> 98.5% of ERCOT load settled with 15-minute interval data 7.1M Advanced Metering System (AMS) Electric Service Identifier (ESIIDs) included in settlement as of January 2018.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 01/31/2018, the daily average settlement dollars for January 2018 are \$23.19M, which is up from \$11.72M in December 2017 and up from January 2017 which had an average of \$12.62M. The Operating Days pushing this metric out of normal ranges are the period of extreme weather that occurred 01/16/2018-1/18/2018 and the Operating Day ERCOT experienced about 75 minutes of prices above \$500/MWh, 01/23/2018. Higher than average settlement dollars are expected under these circumstances.
Revenue Neutrality	No	<ul style="list-style-type: none"> As of settlement of Operating Day 01/31/2018, Revenue Neutrality uplift is a charge of \$16.57M, which is up from a \$7.18M charge in December 2017 and up from a \$10.46M charge in January 2017. The main driver of higher than average RENA was significant congestion in the RTM combined with the treatment of PTP Obligations with Links to Options in real-time and some over-selling of transmission for 01/16/2018 through 1/18/2018.
Market-Based Uplift to Load	No	<ul style="list-style-type: none"> As of settlement of Operating Day 01/31/2018, the market-based uplift to load is a charge of \$71.78M, as opposed to a \$9.19M charge in December 2017 and a charge of \$33.71M in January 2017. The main driver for higher than average uplifts to Load was the high ancillary service costs for non-spin that occurred on 01/17/2018.

Operational Dashboard – February 2018

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"> 98.7% 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 February 2018.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 02/28/2018, the daily average settlement dollars for February are \$13.61M, which is down from \$23.19M in January 2018 and up from February 2017 which had an average of \$9.51M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 02/28/2018, Revenue Neutrality uplift is a charge of \$0.74M, which is down from January 2018 which was a charge of \$16.57M and down from February 2017 which was a charge of \$5.73M.
Market-Based Uplift to Load	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 02/28/2018, the market-based uplift was a charge of \$0.25M, as opposed to a charge of \$71.78M in January 2018 and a charge of \$21.48M in February 2017.

Major Project Highlights – (as of 03/23/2018)

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. The team continues to address the outstanding defects and production readiness activities that delayed the production go-live. <ul style="list-style-type: none"> The delay is caused by increased 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; testing will continue through June 2018. ERCOT has defined stability criteria that must be met before we declare readiness for go-live. ERCOT will provide the market with at least 60 days' notice prior to the production release once the stability criteria are met.
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 went live in February and delivered NPRRs 648, 683, 743, 760 and 800 via the existing CMM application. Phase 1B development and FAT efforts continue to focus on delivery of the technical refresh along with related in-scope NPRRs. 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 for Stage 1. Multiple stages will be delivered on this initiative with the first stage tracking for delivery in Q2. <ul style="list-style-type: none"> This initiative along with the GINR project is being delivered with a single framework known as RIOO (Resource Integration and Ongoing Operations). Business Requirements definition activities continue. Data analysis for wind resources is complete and will be final reviewed with market on 3/29. Stage 1 will complete with a design for wind resources data collection along with a plan for future stage releases.

Major Project Highlights – (as of 03/23/2018) – 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 and on schedule. • The team continues to work with the 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 schedule and budget. <ul style="list-style-type: none"> ◦ Several factors have contributed to the schedule delay, including complexity with data modeling efforts, integration work, and data validation efforts. ◦ Resources have been added in project management, data collection, testing and operational readiness areas. • The team is reconciling the schedule to account for the delays. A change control seeking approval of a new schedule and budget will be presented in the April timeframe. The team continues to target a 2018 go-live.

Major Project Highlights – (as of 03/23/2018) – 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) – Control Room builds are underway with the Go-Live occurring 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) – Software has been purchased., the training has been completed, and the deployed of the logging system is planned for the end of May. Stage 3 (Execution) – The new network analysis tool has been delivered, the training has been completed, and deployment of the network analysis system is planned for end of June. The local network load balancing solution deployment will be completed in 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. Moving the project to Closing at the end of March. Stage 4 (Execution) – SQL database cluster builds, with their associated database migrations, are 87% complete. Stage 5 (Execution) – Legacy systems that require P2V migrations are 33% complete.. Stage 7 (Closing) – network attached storage file system migrations have been completed. Stage 8 (Execution) – remaining project migrations that are not part of the first 7 stages are scheduled, and these migrations are 72% complete.

Major Project Highlights – (as of 03/23/2018) – 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. Decommissions are underway and will be completed in early April. Stage 2 (Execution) – migrations of all databases and files systems are complete, with storage hardware decommissions underway. The DB Snap Manager solution deployment completion in mid-April. Remote Access (Execution) – The remote access production builds are underway. Operational Testing to begin in mid-April, with production cutover scheduled for the middle of May. 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) – The voice firewall systems received. Scheduling deployment of this hardware in April. Stage 2 (Not Started) – This stage will begin planning in in early April. Telecom-Data Center Connectivity (Execution) – Procurement of the replacement hardware responsible for connecting the fiber channel network between data centers is complete. Installation will begin in mid-April. MV90 Hardware Refresh (Concept) – The project for replacing the MV90 smart meter telemetry system will initiate in mid-April.

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