



Item 4.3: Operations Report (July – August 2018)

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ERCOT

Board of Directors Meeting

ERCOT Public
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Summary – July 2018

Operations

- The preliminary Settlements hourly peak demand of 73,308* MW on July 19 was lower than the day-ahead mid-term load forecast peak of 73,518 MW for the same operating hour.
 - The operational instantaneous peak demand was 73,405 MW (telemetry).
- Day-ahead load forecast error for July was 1.97%
- ERCOT issued 12 notifications:
 - Four Advisories issued due to Physical Responsive Capability being below 3000 MW
 - One Advisory issued for extreme hot weather
 - Five DC Tie-related Watches
 - One OCN issued for extreme hot weather
 - One OCN issued for projected reserve capacity shortage

Planning Activities

- 404 active generation interconnection requests totaling 79,852 MW, including 37,697 MW of wind generation, as of July 31, 2018. Twenty-five additional requests and an increase of 2,832 MW from June 30, 2018.
- 21,190 MW wind capacity in commercial operations as of August 1, 2018.

Summary – August 2018

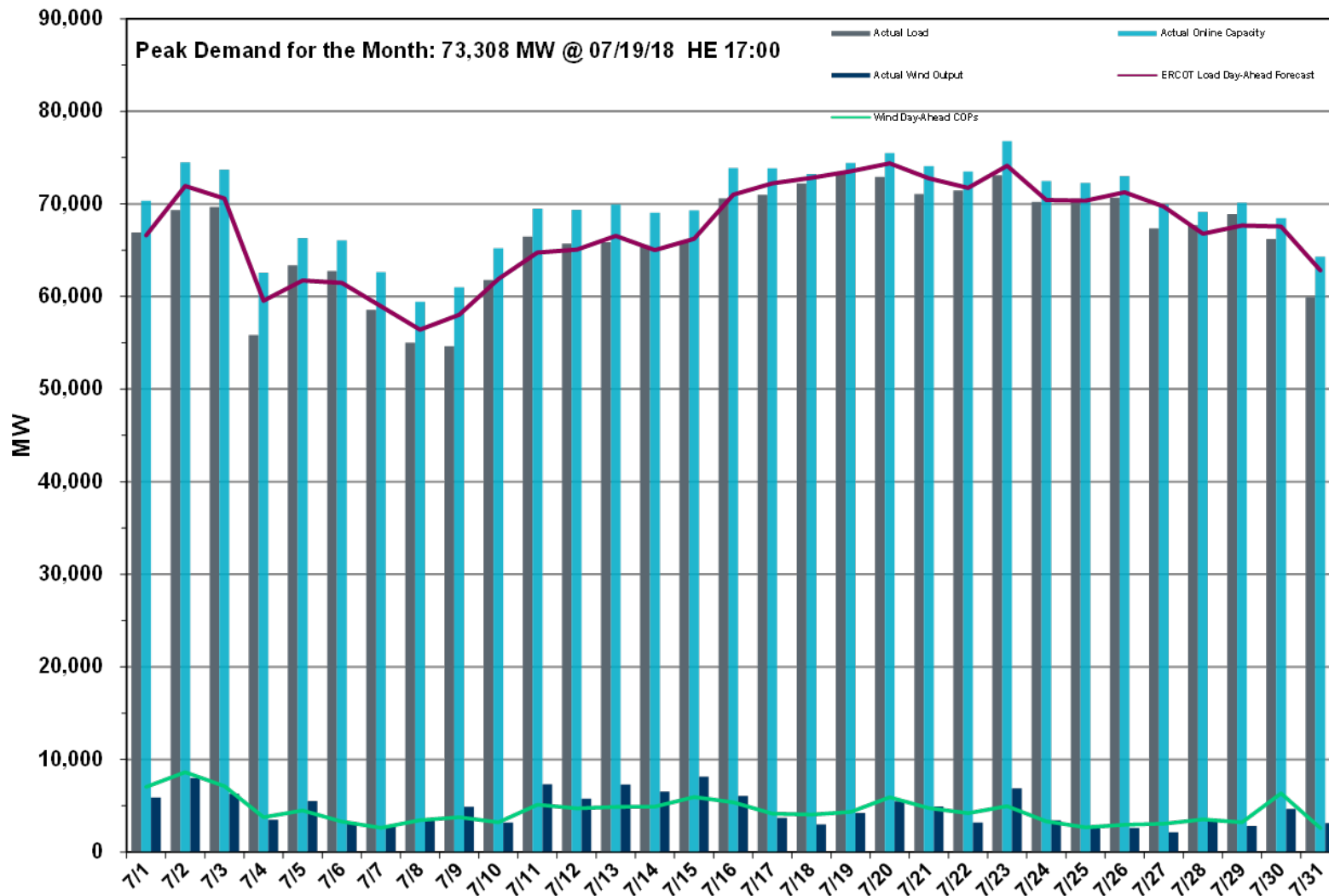
Operations

- The preliminary Settlements hourly peak demand of 69,889* MW on August 23 was lower than the day-ahead mid-term load forecast peak of 70,748 MW for the same operating hour.
 - The operational instantaneous peak demand was 69,982 MW (telemetry).
- Day-ahead load forecast error for August was 1.64%
- ERCOT issued 9 notifications:
 - Three Advisories issued due to Physical Responsive Capability being below 3000 MW
 - Three DC Tie-related Watches
 - Three OCN issued for projected reserve capacity shortage

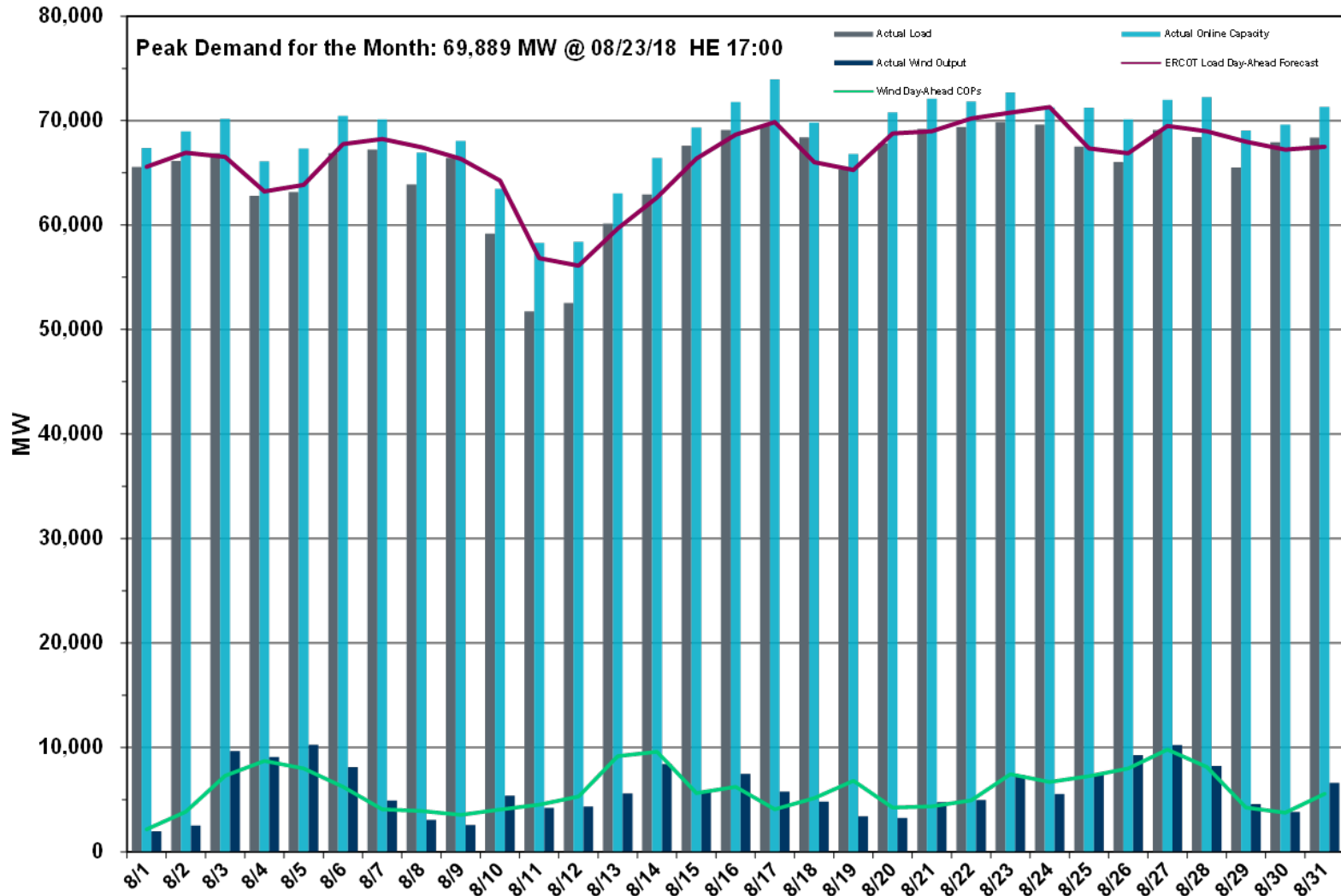
Planning Activities

- 417 active generation interconnection requests totaling 83,491 MW, including 40,851 MW of wind generation, as of August 30, 2018. Thirteen additional requests and an increase of 3,639 MW from July 31, 2018.
- 21,190 MW wind capacity in commercial operations as of September 1, 2018.

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



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



Market Statistics – July 2018

Market Statistics	July 2017	July 2018	2017 Average	2018 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	92%	89%	90%	89%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	34.17	96.72	26.63	42.69
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	30.83	47.20	26.61	32.06
Average East Houston Fuel Index Price (\$/MMBtu)	2.97	2.89	2.98	3.02

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 – August 2018

Market Statistics	August 2017	August 2018	2017 Average	2018 YTD Average
Percentage of Real-Time load transacted in the Day-Ahead Market ¹	92%	89%	90%	89%
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	29.52	34.24	26.63	41.42
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	28.50	38.17	26.61	32.98
Average East Houston Fuel Index Price (\$/MMBtu)	2.86	3.01	2.98	3.02

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 – July & August 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 – July & August 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)	No	<ul style="list-style-type: none"> • The average energy price across the system reflects marginal offers and scarcity pricing impacts • July average DAM prices exceeded average RTM prices by \$49.52/MWh due to market expectations between July 16th and 26th that did not materialize in Real-Time • For August, the difference between the average DAM and RTM prices was back within a more typical range
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 – July & August 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 1 resource was committed in July to resolve system capacity shortage 10 resources were committed in August to resolve congestion and system capacity shortage
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 not deployed in July or August
Congestion Revenue Rights Price Convergence	No	<ul style="list-style-type: none"> For July, CRRs continued to have significantly higher DAM values than auction costs. Higher-than-expected congestion in the Day-Ahead Market was the main driver In August, DAM values for CRRs declined significantly and were more in alignment with auction cost

Operational Dashboard – July 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"> 99.0% of ERCOT load settled with 15-minute interval data. 7.2M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of July 2018.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 07/31/2018, the daily average settlement dollars for July 2018 are \$34.48M, which is up from \$25.47M in June 2018 and up from July 2017 which had an average of \$15.51M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 07/31/2018, Revenue Neutrality uplift is a charge of \$8.86M, which is down from a \$30.46M charge in June 2018 and up from a \$1.45M charge in July 2017.
Market-Based Uplift to Load	No	<ul style="list-style-type: none"> As of settlement of Operating Day 07/31/2018, the market-based uplift to load is a charge of \$77.07M, as opposed to a \$21.52M charge in June 2018 and a credit of \$13.63M in July 2017. The driver for this is high Responsive Reserve Service costs.

Operational Dashboard – August 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"> 99.1% of ERCOT load settled with 15-minute interval data. 7.2M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of August 2018.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 08/31/2018, the daily average settlement dollars for August are \$19.61M, which is down from \$34.48M in July 2018 and up from August 2017 which had an average of \$15.09M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 08/31/2018, Revenue Neutrality uplift is a charge of \$12.61M, which is up from July 2018 which was a charge of \$8.86M and up from August 2017 which was a charge of \$1.46M.
Market-Based Uplift to Load	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 08/31/2018, the market-based uplift was a credit of \$5.78M, as opposed to a charge of \$77.07M in July 2018 and a credit of \$12.58M in August 2017.

Select Project Highlights – (as of 09/21/2018)

Project	Trending as Expected	Further Information
<p>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</p>	Yes*	<p>The project is in Execution and is trending to the revised schedule and budget.</p> <ul style="list-style-type: none"> • The team has addressed all outstanding defects and set a go-live date of 11/19/2018. • 60 Day Market Notice sent out on 09/19/2018. • Operational readiness activities and communication with market participants is ongoing. • Leadership is defining improvements to the roles and practices for the CRR application vendor engagement, support, and delivery. • * The project is now considered trending but overall, will not meet the original schedule and budget.
<p>2015 CMM NPRRs and Tech Refresh – Combines CMM NPRRs, a technical refresh and new Treasury functionality into a single project to gain efficiencies</p>	No	<p>The CMM Phase 1A project completed in February 2018. The CMM Phase 1B project is in Execution and not trending to schedule or budget.</p> <ul style="list-style-type: none"> • Phase 1B scope includes delivery of the CMM technical refresh and a subset of credit-related NPRRs (NPRR519, NPRR620, NPRR660, NPRR741, NPRR755). • Early software deliveries did not meet expectations and needed additional work to complete. • Changes have been made to roles, process, and governance to mitigate identified risks and challenges. • Ongoing re-plan activities take into account the delay and the impact of the mitigation measures. • A revised go-live date will be established in October.
<p>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)</p>	Yes	<p>Alignment of the project schedule with the Digital Engagement Strategy (DES) delivery roadmap continues. In the interim, execution activities continue to make progress in the following areas:</p> <ul style="list-style-type: none"> • RFP responses for development support (UI/UX and API) are under review by ERCOT team members with a goal to begin work in Q4 2018. • Critical architecture work (e.g., data architecture, technical architecture) is in progress and on schedule. • Ongoing delivery execution activities are under review and being aligned with the DES roadmap. This alignment addresses both the new Generation Interconnection Request (GINR) application and the replacement of the Resource Asset Registration Form (RARF).

Select Project Highlights – (as of 09/21/2018)

Project	Trending as Expected	Further Information
<p>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</p>	Yes	<p>The project is in Execution and tracking to approved schedule and budget. The following tasks are in progress, and on target for substantial completion date 10/16.</p> <ul style="list-style-type: none"> • Ceiling tiles in progress • Exterior skins in progress • Interior finishings • AV Coordination and installation of video wall • Security system install • Electrical coordination, fiber terminations and cabling • Final procurement activities for IT needs, furnishings, etc.
<p>Identity & Access Management – Replaces the current identity and access management (IAM) system, improving access control and the user experience</p>	No	<p>The project is in Execution and not trending to schedule or budget.</p> <ul style="list-style-type: none"> • Test and data verification activities are underway • Schedule and budget impacts are associated with: <ul style="list-style-type: none"> - Additional scope added to meet objectives for user experience, data integrity and reporting - Additional effort to complete existing data cleanup, data integration, data analysis, and data accuracy • Re-plan efforts will complete in early October with expected migration to new system to start in Q1, 2019 and complete in Q2, 2019
<p>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</p>	No	<p>The project is in the Execution Phase and is not trending to budget. The schedule has not slipped but is at risk if testing encounters many defects that cannot be resolved on a tight schedule.</p> <ul style="list-style-type: none"> • Core development and configuration work is substantially complete and focus is shifting to business process testing, user acceptance testing, operational readiness, and cutover. • Budget impact is caused by additional analysis and programming that was required to populate critical data fields. • The schedule includes milestone checkpoints to confirm workflow testing and operational readiness before finalizing a go-live date. • The team plans to request additional funds following an early October milestone checkpoint.

Select Project Highlights – (as of 09/21/2018)

Project	Trending as Expected	Further Information
<p>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</p>	<p>Yes</p>	<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 cutovers to the new Control Room phones and hotline system are scheduled to occur in early October. • 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) – the deployment of the new logging system went live on 9/14/18. Decommission tickets have been submitted. ○ Stage 3 (Execution) – the local network load balancing solution Go-Live will be completed in mid-November. The deployment of the new network analysis tool is going through issue resolution, with the Go-Live occurring by the end of December. • 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 (Closing) – application migrations that require IP address changes under this stage have been completed. ○ Stage 4 (Closing) – SQL database cluster builds and database migrations for this stage have been completed. ○ Stage 5 (Closing) – Legacy Linux systems that require P2V migrations for this stage have been completed. ○ Stage 6 (Execution) – All MSE related applications have been migrated to new hardware. A re-alignment of MSE applications is being discussed and planned. ○ Stage 7 (Closing) – network attached storage file system migrations have been completed. ○ Stage 8 (Closing) – any remaining project migrations, not included in the first 7 stages, have been completed. All system decommissions, for the entire project, are underway.

Select Project Highlights – (as of 09/21/2018)

Project	Trending as Expected	Further Information
<p>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</p>	<p>Yes</p>	<p>The remaining active DC4 projects are tracking to the approved schedule and budget:</p> <ul style="list-style-type: none"> • 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 (Closing) – the voice firewall systems deployment has been completed. ○ Stage 2 (Planning) – the RFP for the voice over IP solution has been submitted and awaiting vendor responses. The purchase and deployment of the solution will occur in early-to-mid 2019. • Telecom-Data Center Connectivity (Execution) – the project hardware has been delivered to the vendor site, for build and configuration. The fully built and configured hardware will be delivered back to ERCOT in early October, for cutovers scheduled in early November. • MV90 Hardware Refresh (Execution) – this project is scheduled for a test environment installation of the new MV90 smart meter telemetry system in November. After the testing is complete, purchase and deployment of the production system will begin in Q1 2019.

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