



Item 4.2: Operations Report (May – June 2017)

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ERCOT

Board of Directors Meeting

ERCOT Public
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Summary – May 2017

Operations

- The preliminary Settlements hourly peak demand of 59,244* MW on May 26 was lower than the day-ahead mid-term load forecast peak of 60,476 MW for the same operating hour.
 - The operational instantaneous peak demand was 59,521 MW (telemetry).
- Day-ahead load forecast error for May was 2.77%
- ERCOT issued 11 notifications:
 - Two Advisories issued due to Physical Responsive Capability being below 3,000 MW
 - One Advisory issued due to K-7 Index Level Geomagnetic Disturbance Alert
 - One Advisory issued due to ERCOT's VSAT tool unavailable
 - One Advisory issued due to ERCOT's SE/RTCA unavailable
 - Four Watches issued for the de-rate of the Railroad DC Tie Transfer capability
 - One Watch issued for the DC_S (Eagle Pass) Tie Tripped
 - One OCN issued for Capacity Insufficiency

Planning Activities

- 290 active generation interconnection requests totaling 64,371 MW, including 28,230 MW of wind generation, as of May 31, 2017. Six additional requests and a decrease of 469 MW from April 30, 2017.
- 19,079 MW wind capacity in commercial operations as of June 1, 2017.

Summary – June 2017

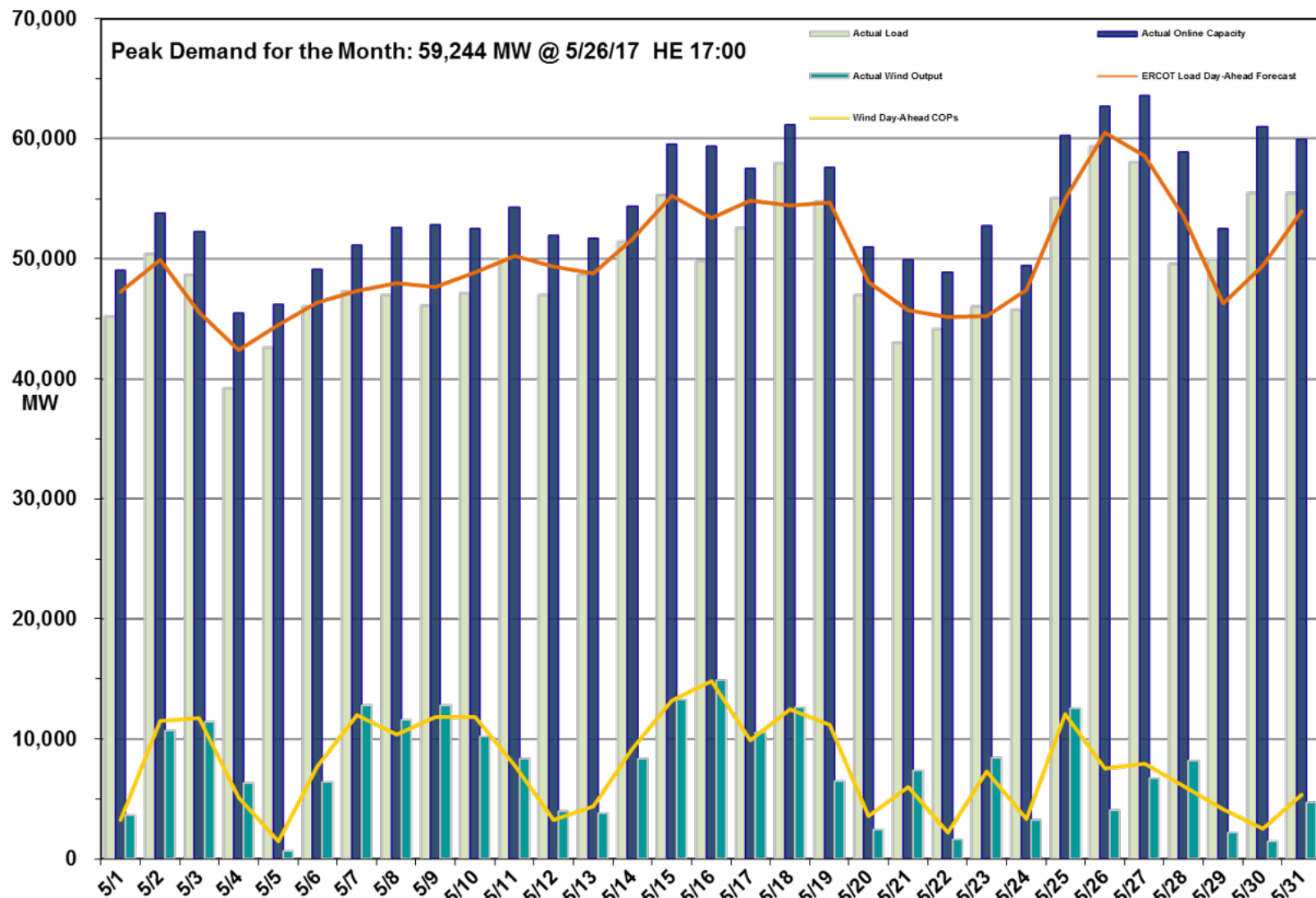
Operations

- The preliminary Settlements hourly peak demand of 67,617* MW on June 23 was higher than the day-ahead mid-term load forecast peak of 67,553 MW for the same operating hour.
 - The operational instantaneous peak demand was 67,813 MW (telemetry).
- Day-ahead load forecast error for June was 2.39%
- ERCOT issued 11 notifications:
 - Five Advisories issued due to Physical Responsive Capability being below 3000 MW
 - One Advisory issued due to DAM posting delay
 - Two Watches issued for the Railroad DC Tie due to no market solution for the post contingency loss of SPOLPHA8
 - One Watch issued for the Railroad DC tie due to no market solution for a base case overload on the North McAllen to West McAllen 138kv circuit
 - One Watch issued for the Railroad DC tie due to Rio Grande Valley Import after a forced outage
 - One OCN issued for Tropical Storm Cindy

Planning Activities

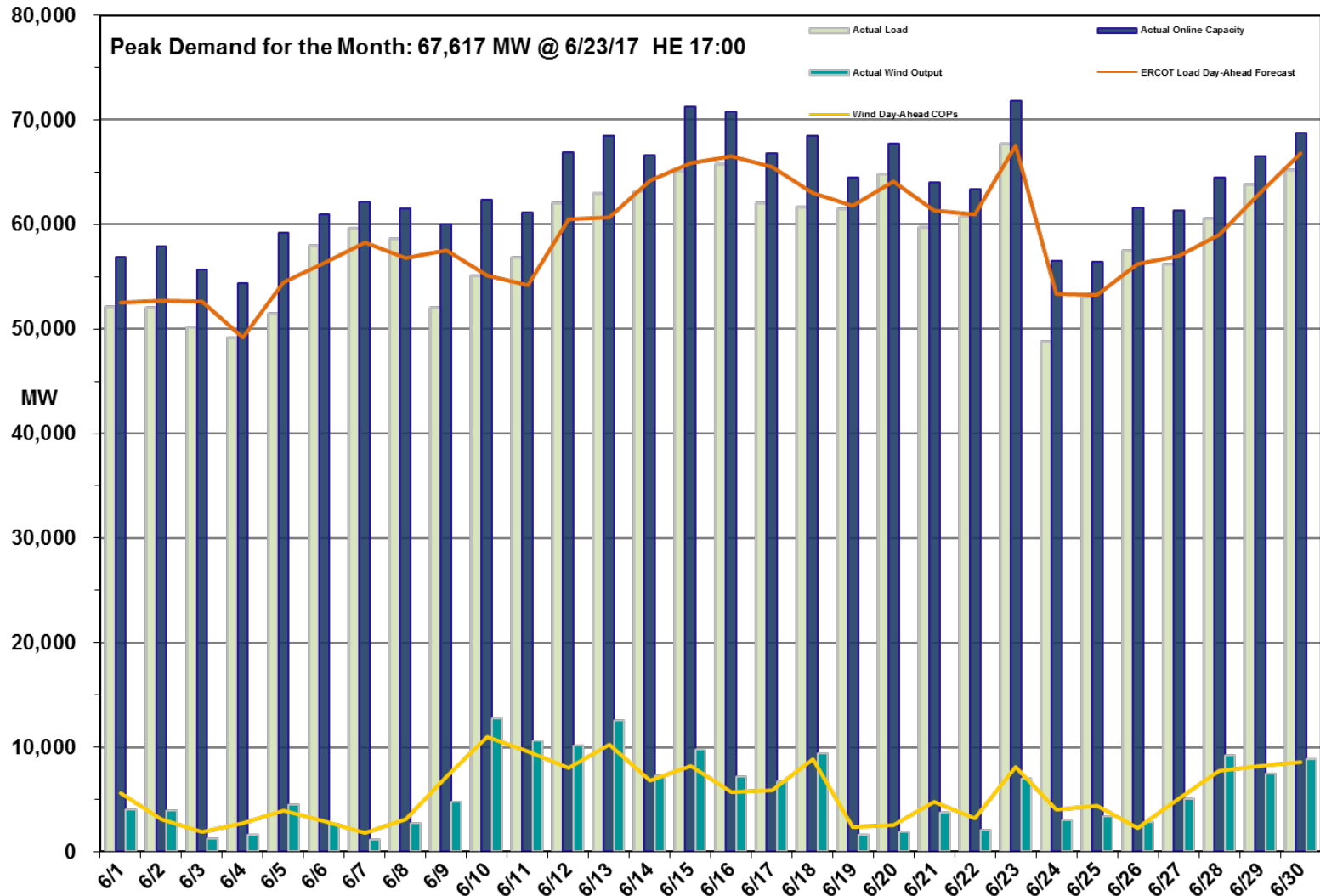
- 306 active generation interconnection requests totaling 67,558 MW, including 30,219 MW of wind generation, as of June 30, 2017. Sixteen additional requests and an increase of 3,187 MW from May 31, 2017.
- 19,253 MW wind capacity in commercial operations as of July 1, 2017.

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



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

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Market Statistics – May 2017

Market Statistics	May 2016	May 2017	2016 Average	2017 YTD Average
Percentage of Real-Time load hedged in Day-Ahead Market (%)	122	120	122	126
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	19.38	27.12	24.56	24.61
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	18.01	32.73	23.51	25.84
Average East Houston Fuel Index Price (\$/MMBtu)	1.85	3.24	2.45	3.05

Market Statistics – June 2017

Market Statistics	June 2016	June 2017	2016 Average	2017 YTD Average
Percentage of Real-Time load hedged in Day-Ahead Market (%)	115	118	122	124
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Day-Ahead Market (\$/MWh)	26.23	30.25	24.56	25.76
Average 'ERCOT Hub Average 345 kV Hub' Settlement Point Price in Real-Time (\$/MWh)	23.87	28.71	23.51	26.43
Average East Houston Fuel Index Price (\$/MMBtu)	2.46	3.05	2.45	3.05

Operational Performance Measures – May & June 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 – May & June 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.
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 – May & June 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. 7 Resources were committed in May to resolve congestion and capacity shortage. 14 Resources were committed in June to resolve congestion and voltage stability.
Supplemental Ancillary Service Market Monthly Summary	Yes	<ul style="list-style-type: none"> Normal trend indicates that infeasibility was not a major concern.
Non-Spinning Reserve Service Deployment	Yes	<ul style="list-style-type: none"> Non-Spin was deployed on May 15 & 16 for voltage support. Non-Spin was deployed on June 2 for voltage support and on June 19 for congestion.
Congestion Revenue Rights Price Convergence	No	<ul style="list-style-type: none"> Recent trends in CRR show day-ahead values significantly above auction costs. Higher-than-expected congestion in the Day-Ahead Market is the main driver.

Operational Dashboard – May 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"> 98.9% of ERCOT load settled with 15-minute interval data. 7.0M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of May 2017.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 05/31/2017, the daily average settlement dollars for May 2017 are \$17.19M, up from \$15.39M in April 2017 and up from May 2016, which had an average of \$9.34M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 05/31/2017, Revenue Neutrality uplift is a charge of \$8.76M, which is down from a \$9.88M charge in April 2017 and up from a \$3.65M charge in May 2016.
Market-Based Uplift to Load	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 05/31/2017, the market-based uplift to load is a charge of \$12.09M, as opposed to a \$25.76M charge in April 2017 and a charge of \$7.37M in May 2016.

Operational Dashboard – June 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"> 99.0% of ERCOT load settled with 15-minute interval data. 7.0M Advanced Metering System (AMS) Electric Service Identifier (ESIID)s included in settlement as of June 2017.
Settlement Dollars	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 06/30/2017, the daily average settlement dollars for June are \$17.23M, which is up from \$17.19M in May 2017 and up from June 2016 which had an average of \$13.62M.
Revenue Neutrality	Yes	<ul style="list-style-type: none"> As of settlement of Operating Day 06/30/2017, Revenue Neutrality uplift is a charge of \$10.36M, which is up from May 2017 which was a charge of \$8.76M and up from June 2016 which was a credit of \$1.55M.
Market-Based Uplift to Load	No	<ul style="list-style-type: none"> As of settlement of Operating Day 06/30/2017, the market-based uplift was a credit of \$13.64M, as opposed to a charge of \$12.09M in May 2017 and a credit of \$1.36M in June 2016. This is mainly due to a \$24.2M credit to Load via the CRR Balancing Account. Higher-than-expected congestion in the Day-Ahead Market has been the main driver of the higher-than-expected CRR Balancing Account balance.

Major Project Highlights – (as of 07/31/2017)

Project	Trending as Expected	Further Information
NMMS Upgrade Project – Replace the current Siemens NMMS application with the next generation of model management software available from Siemens	Yes	<ul style="list-style-type: none"> • Project continues in stabilization through August; it is tracking to the approved schedule and budget. <ul style="list-style-type: none"> ◦ The first planned stabilization release went into production in early June. A second release is targeted for early August. ◦ Project expects to complete Stabilization and move to closing in early September.
CRR Framework Upgrade Project – Improves the ability to support and maintain the CRR system by upgrading the User Interface framework and its related components to current versions	Yes	<ul style="list-style-type: none"> • The project is in the Execution phase and tracking to approved schedule and budget. Go-live is scheduled for late January 2018. • iTest commenced in June 2017. • A three-month Market Requalification period will commence in September 2017; Market Participant Training will coincide with the Market Re-qualification period.
Load Forecast Enhancements – Provide for higher availability of Load Forecast data feeds to EMS environment, additional column in EMS to import internal Short Term Load Forecast (STLF), provide Mid-Term Load Forecast (MTLF) tuning and training along with Itron software upgrade	Yes	<ul style="list-style-type: none"> • Project went live on 06/27 and is in Stabilization tracking to approved budget and schedule. • The team is working three data issues and planning for a stabilization release in August. • Project will complete Stabilization and move to closing in October.
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. The team has completed a re-plan effort to address departure of two key team resources and has taken actions to mitigate impacts to the planned delivery date. <ul style="list-style-type: none"> ◦ Phase 1A will deliver NPRRs 648, 683, 743, 760 and 800 via the existing CMM application. The estimated completion date is targeted for Q1 2018. ◦ 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 has been re-planned and is on track; FAT testing will start in August. The team continues to assess schedule impacts to confirm the go-live date. • Phase 2 will deliver Financial Transfer functionality and additional Credit/Treasury efficiencies. Team continues to document Requirements and User Interface designs and workflows. The go-live date will be set once re-plan efforts for Phase 1 are complete. • Phase 3 will deliver any remaining low-priority scope. The go-live date for this phase will be addressed following completion of Planning for Phase 2.

Major Project Highlights – (as of 07/31/2017) – continued

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>	<ul style="list-style-type: none"> • Most of the DC4 Program projects are in Planning/Execution and all are tracking to the approved schedule and program budget <ul style="list-style-type: none"> ○ Compute-DB Install and Migration Project – Successfully completed ○ Network-Core Network Project – Successfully completed ○ Telecom-Control Room & Grid Ops Project (Planning) – Delivery and testing of the Operating Training System (OTS) phone system has been completed. The deployment and execution of the control room hardware will begin in August. ○ 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 – Execution phase, the purchase of the load balancing solution has been completed. ○ Stage 2 – Planning phase, proof-of-concepts are underway for a new network logging system. ○ Stage 3 – Planning phase, planning for network analysis tool and balancing equipment ○ Compute-x86 Base Install Project – Successfully completed ○ Application Migration Project – In progress of migrating application and databases from legacy systems to the new converged infrastructure systems: <ul style="list-style-type: none"> ○ Stage 1 (Closing) – Virtual-to-virtual (V2V) system migrations have been completed. ○ Stage 2 (Execution) – Physical-to-virtual (P2V) system migrations are underway. ○ Stage 3 (Planning) – Applications with IP address changes are in migration planning. ○ Stage 4 (Planning) – SQL database clusters rebuilds and their database migrations are in planning. The production SQL database migrations will begin in October. ○ Stage 7 (Planning) – Network attached storage migration planning is underway. ○ <u>More than 70% of the applications are running on the new systems.</u> ○ Storage-DB Install and Migration – This project 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) – Deployment of all storage hardware, including backup database appliances, and tape backup upgrades. NetApp storage deployment for Commercial systems is nearing completion. Oracle database backup appliances are being tested Detail planning for EMC upgrades underway. ○ Stage 2 (Planning) – Migration of all databases and files systems is currently in planning, with production migrations beginning in September. ○ Remote Access (Execution) – The building of the remote access system on the new converged infrastructure has completed planning, and the production deployments will begin in September.

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