

August 2016 ERCOT Monthly Operations Report

Reliability and Operations Subcommittee Meeting

October 6th, 2016

Table of Contents

[1. Report Highlights 1](#_Toc461701173)

[2. Frequency Control 2](#_Toc461701174)

[2.1. Frequency Events 2](#_Toc461701175)

[2.2. Responsive Reserve Events 3](#_Toc461701176)

[2.3. Load Resource Events 3](#_Toc461701177)

[3. Reliability Unit Commitment 3](#_Toc461701178)

[4. Wind Generation as a Percent of Load 5](#_Toc461701179)

[5. Congestion Analysis 5](#_Toc461701180)

[5.1. Notable Constraints for August 5](#_Toc461701181)

[5.2. Generic Transmission Constraint Congestion 7](#_Toc461701182)

[5.3. Manual Overrides for August 7](#_Toc461701183)

[5.4. Congestion Costs for Calendar Year 2016 7](#_Toc461701184)

[6. System Events 8](#_Toc461701185)

[6.1. ERCOT Peak Load 8](#_Toc461701186)

[6.2. Load Shed Events 8](#_Toc461701187)

[6.3. Stability Events 8](#_Toc461701188)

[6.4. Notable PMU Events 8](#_Toc461701189)

[6.5. TRE/DOE Reportable Events 8](#_Toc461701190)

[6.6. New/Updated Constraint Management Plans 8](#_Toc461701191)

[6.7. New/Modified/Removed SPS 8](#_Toc461701192)

[6.8. New Procedures/Forms/Operating Bulletins 9](#_Toc461701193)

[7. Emergency Conditions 9](#_Toc461701194)

[7.1. OCNs 9](#_Toc461701195)

[7.2. Advisories 9](#_Toc461701196)

[7.3. Watches 10](#_Toc461701197)

[7.4. Emergency Notices 10](#_Toc461701198)

[8. Application Performance 10](#_Toc461701199)

[8.1. TSAT/VSAT Performance Issues 10](#_Toc461701200)

[8.2. Communication Issues 10](#_Toc461701201)

[8.3. Market System Issues 10](#_Toc461701202)

[Appendix A: Real-Time Constraints 11](#_Toc461701203)

# Report Highlights

* The unofficial ERCOT peak for August was 71,197 MW. This is an unofficial ERCOT peak. Multiple peaks were set in the month.
* There were seven frequency events in August. PMU data indicates the ERCOT system transitioned well in each case.
* There were four instances where Responsive Reserves were deployed, three of which were the result of frequency events.
* There were eighteen RUC commitments in August.
* The level of reportable SCED congestion decreased in August. This congestion was due primarily to high loads on peak days, planned outages and area load/gen patterns as well as high North to Houston Imports. There were thirty-five instances over 26 days on the Generic Transmission Constraints (GTCs) in August. There were four days of activity on the Zorillo – Ajo GTC, two days on the Panhandle GTC, four days on the Laredo GTC and twenty-five days on the Liston GTC in August. There was no activity on the remaining GTCs during the Month.
* There was a loss of load event for the month on the 23rd. It was not directed by ERCOT.
* There were two application issues to report for August. On 8/25/16 there was a SCED failure and on 8/31/16 there was a delay in the posting of the DAM solution.

# Frequency Control

## Frequency Events

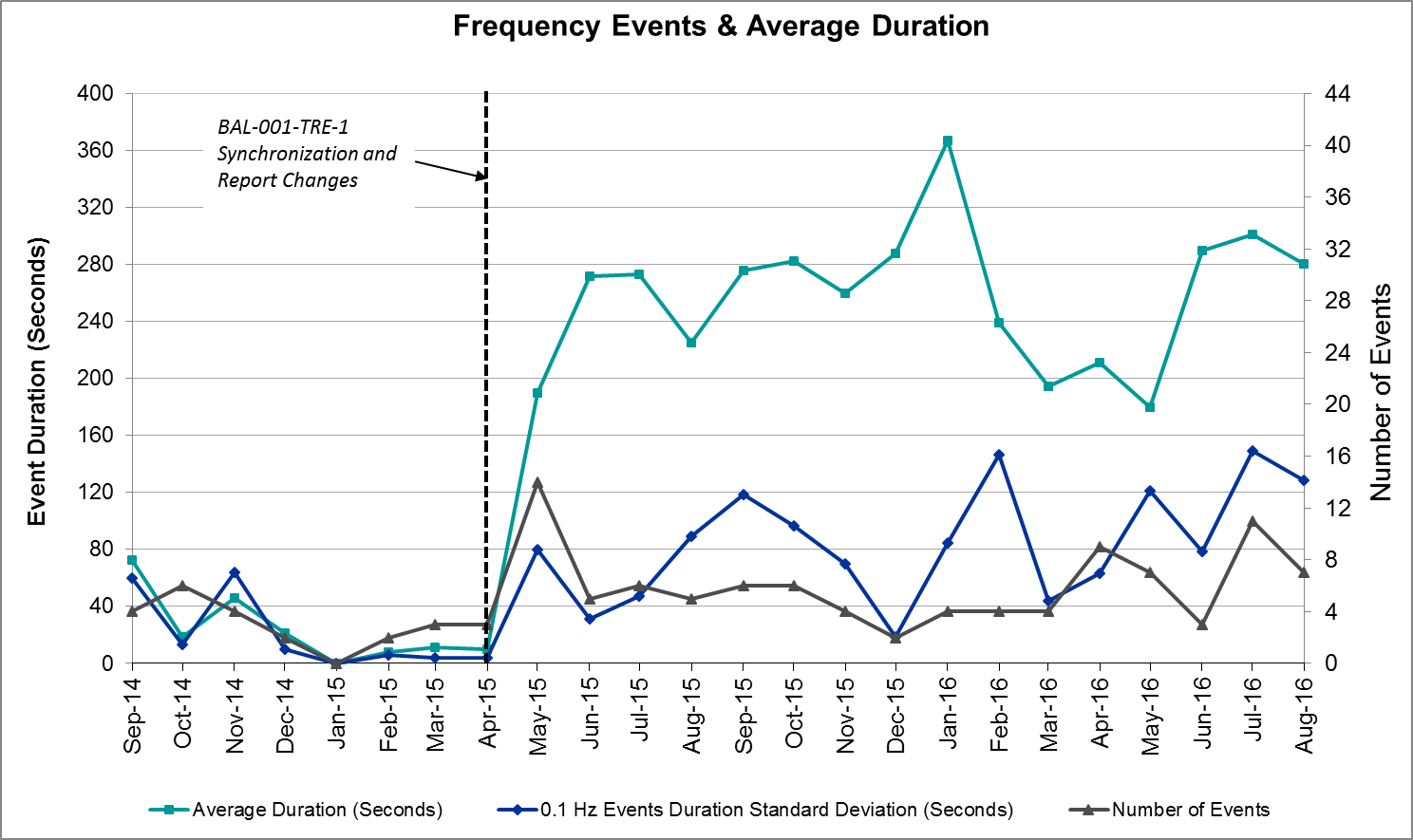
The ERCOT Interconnection experienced seven frequency events in August, six of which resulted from Resource trips. The average event duration was approximately 0:04:41.

When analyzing frequency events, ERCOT evaluates PMU data according to industry standards. Events with an oscillating frequency of less than 1 Hz are considered to be inter-area, while higher frequencies indicate local events. Industry standards specify that damping ratio for inter-area oscillations should be 3.0% or greater. All events listed below indicate the ERCOT system met these standards and transitioned well after each disturbance.

Reported frequency events will include both frequency events where frequency was outside the range of 60±0.1 Hz as well as those determined to be Frequency Measurable Events (FME) as defined by BAL-001-TRE-1. Delta Frequency is defined as the difference between the pre-perturbation and post-perturbation frequency. The Duration of Event is defined as the time it takes for the frequency to recover to lesser/greater of the frequency at the time of the frequency event (t(0) or “A-point”) for low/high-frequency events, respectively. Further details on FMEs can be found in the MIS posted BAL-001-TRE-1 PDCWG Unit Performance reports. A summary of the frequency events is provided below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date and Time** | **Delta Frequency** | **Max/Min Frequency** | **Duration of Event** | **PMU Data** | | **Load** | **Wind** | **Inertia** | **Comments** |
| **(Hz)** | **(Hz)** | **Oscillation Mode (Hz)** | **Damping Ratio** | **(MW)** | **%** | **(GW-s)** |  |
| 8/2/2016 18:37 | 0.071 | 59.91 | 0:07:09 | No PMU Data Available. | | 65,997 | 10% | 352,201 | Unit Trip of 526MW |
| 8/15/2016 19:39 | 0.091 | 59.83 | 0:05:04 | 0.66 | 14% | 46,541 | 6% | 305,126 | Unit Trip of 856MW |
| 8/23/2016 18:05 | -0.008 | 60.10 | 0:00:30 | 0.66 | 6% | 61,120 | 17% | 325,123 | Loss of 495MW of Load |
| 8/27/2016 14:43 | 0.070 | 59.92 | 0:03:24 | No PMU Data Available. | | 56,038 | 3% | 324,034 | Unit Trip of 484MW |
| 8/28/2016 14:13 | 0.098 | 59.88 | 0:05:34 | 0.64 | 10% | 54,209 | 2% | 316,030 | Unit Trip of 534MW |
| 8/31/2016 2:53 | 0.074 | 59.89 | 0:05:32 | No PMU Data Available. | | 35,277 | 3% | 265,398 | Unit Trip of 596MW |
| 8/31/2016 13:18 | 0.057 | 59.91 | 0:05:31 | No PMU Data Available. | | 58,207 | 1% | 347,753 | Unit Trip of 453MW |

(Note: frequency events highlighted in blue have been identified as FMEs per BAL-001-TRE-1 and the Performance Disturbance Compliance Working group.)



## Responsive Reserve Events

There were four events where Responsive Reserve MWs were released to SCED in August. The events highlighted in blue were related to frequency events reported in Section 2.1 above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date and Time Released to SCED** | **Date and Time Recalled** | **Duration of Event** | **Maximum MWs Released** | **Comments** |
| 8/15/2016 19:39:50 | 8/15/2016 19:43:18 | 0:03:28 | 769.52 |  |
| 8/27/2016 13:41:02 | 8/27/2016 13:44:30 | 0:03:28 | 458.92 | A resource ran back and tripped, bringing frequency down to 59.88Hz. Event recovered back to 60Hz in 06:38. |
| 8/28/2016 14:13:42 | 8/28/2016 14:17:46 | 0:04:04 | 340.37 |  |
| 8/31/2016 2:53:22 | 8/31/2016 2:56:50 | 0:03:28 | 371.98 |  |

## Load Resource Events

None.

# Reliability Unit Commitment

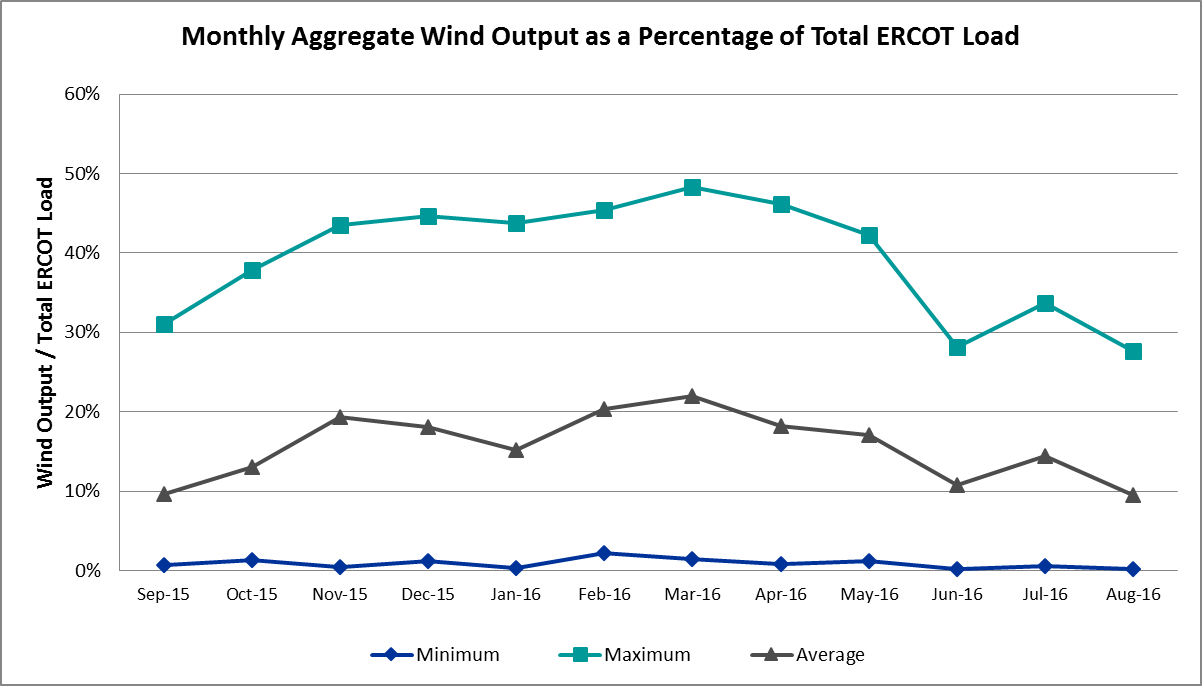
ERCOT reports on Reliability Unit Commitments (RUC) on a monthly basis. Commitments are reported grouped by operating day and weather zone. The total number of hours committed is the sum of the hours for all the units in the specified region. Additional information on RUC commitments can be found on the MIS secure site at Grid 🡪 Generation 🡪 Reliability Unit Commitment.

There were no DRUC commitments in August.

There were 18 HRUC commitments in August.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **HRUC Commitments** | | | | | |
| **Resource Location** | **# of Resources** | **Operating Day** | **Total # of Hours Committed** | **Total MWhs** | **Reason for Commitment** |
| North Central | 2 | 8/2/2016 | 6 | 2,144 | Local Congestion and Capacity |
| South Central | 1 | 8/3/2016 | 1 | 315 | Local Congestion |
| North Central | 2 | 8/4/2016 | 10 | 6,712 | Local Congestion |
| North | 2 | 8/4/2016 | 14 | 7,070 | Local Congestion |
| North Central | 1 | 8/5/2016 | 3 | 414 | Local Congestion |
| South | 2 | 8/6/2016 | 16 | 7,602 | Local Congestion |
| South | 1 | 8/7/2016 | 8 | 2,400 | Local Congestion |
| North Central | 3 | 8/8/2016 | 4 | 596 | Local Congestion |
| Coast | 2 | 8/8/2016 | 6 | 444 | Local Congestion |
| East | 2 | 8/8/2016 | 4 | 345 | Local Congestion |
| North Central | 1 | 8/9/2016 | 8 | 856 | Local Congestion |
| East | 1 | 8/9/2016 | 4 | 440 | Local Congestion |
| East | 2 | 8/10/2016 | 10 | 3,155 | Local Congestion |
| North Central | 5 | 8/10/2016 | 6 | 946 | Local Congestion |
| North Central | 7 | 8/11/2016 | 7 | 1,118 | Local Congestion |
| South | 1 | 8/13/2016 | 8 | 2,400 | Local Congestion |
| Coast | 3 | 8/20/2016 | 11 | 2,250 | Local Congestion |
| North Central | 2 | 8/24/2016 | 14 | 822 | Local Congestion |

# Wind Generation as a Percent of Load



# Congestion Analysis

The number of congestion events experienced by the ERCOT system decreased in August. There were thirty-five instances of activity on the Generic Transmission Constraints (GTCs) in August.

## Notable Constraints for August

Nodal protocol section 3.20 specifies that ERCOT shall identify transmission constraints that are active or binding three or more times within a calendar month. As part of this process, ERCOT reports congestion that meets this criterion to ROS. In addition ERCOT also highlights notable constraints that have an estimated congestion rent exceeding $1,000,000 for a calendar month. These constraints are detailed in the table below. Rows highlighted in blue indicate the congestion was affected by one or more outages. For a list of all constraints activated in SCED for the month of August, please see Appendix A at the end of this report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Overload** | **# of Days Constraint Active** | **Estimated Congestion Rent** | **Transmission Project** |
| DKCT Roans Prarie-Rothwood & Singleton-Tomball 345kV | Singleton - Zenith 345kV | 18 | $15,763,821.37 | Houston Import Project |
| Jim Christal Substation - West Denton 138 kV | Fort Worth Substation - West Denton 138kV | 11 | $9,874,531.49 |  |
| DCKT Chambers - King and Cedar Bayou - Jordan 345 kV | Aritek - Chorin 138kV | 6 | $3,130,019.07 | 4426 |
| South Texas # 1 & # 2 | Blessing - Lolita 138kV | 5 | $2,863,727.72 |  |
| DCKT Flewellen - Obrien and Mason Road 138 kV | Betka - Hockley 138kV | 7 | $2,678,565.19 | 3682A,3682,3682C |
| Lewisville Switch Axfmr12 345/138 kV | Grapevine Highway 360 - Euless 138kV | 6 | $2,573,601.96 |  |
| Fort Worth Subsation to West Denton 138 kV | Jim Christal Substation - West Denton 138kV | 9 | $2,313,207.35 |  |
| Basecase | Laredo GTC | 4 | $2,197,493.89 |  |
| DCKT Jewett - Singleton 345 kV | Btu\_Jack\_Creek - Twin Oak Switch 345kV | 16 | $1,801,128.54 | Houston Import Project |
| Hicks Switch - Alliance & Roanoke Switch 345 kV | Eagle Mountain Ses - Eagle Mountain Poi 138kV | 4 | $1,233,663.60 |  |
| DCKT Whitepint - Lon Hill and South Texas Project 345 kV | Bonnieview - Rincon 69kV | 6 | $653,577.12 |  |
| Basecase | Liston GTC | 25 | $649,013.70 |  |
| Laquinta - Lobo 138 kV | Bruni Sub 69\_1 138/69kV | 16 | $617,381.43 |  |
| DCKT Chambers - King and Cedar Bayou - Jordan 345 kV | Brine - Winfree 138kV | 3 | $597,404.99 |  |
| Aen Dunlap At1h 345/138 kV | Austrop AT2H 345/13.2/138kV | 4 | $514,864.56 | 4086 |
| Locust Substation to Spencer Switch 69 kV | Denton Steam AT1 138/69kV | 11 | $502,451.92 | 5430C |
| DKCT Roans Prarie-Rothwood & Singleton-Tomball 345kV | Singleton - Zenith 345kV | 3 | $207,089.18 | Houston Import Project |
| DCKT Chambers - King and Cedar Bayou - Jordan 345 kV | Brine - Langston 138kV | 3 | $162,477.23 |  |
| Midland East - Moss Switch - Odessa Ehv Switch 345 kV | Odessa EHV Switch to Trigas Odessa Tap | 4 | $155,192.51 |  |
| Uvalde Aep - Odlaw Switchyard 138 kV | Hamilton Road - Maverick 138kV | 6 | $146,259.10 | 16TPIT0024 |
| Gila - Hiway 9 138 kV | Morris Street - Gila 138kV | 6 | $74,398.66 |  |
| Somerset to Howard 138 kV | Pleasanton Sub - Tordillo 138\_69 69kV | 3 | $73,317.53 |  |
| DCKT Ferguson - Granite Mountain and Wirtz - Starcke - Paleface 138 kV | Flat Rock Lcra - Wirtz 138kV | 15 | $48,268.68 | 4465 |
| Spencer Switch to Denton Steam 69 kV | Hickory Substation - Locust Substation 69kV | 3 | $41,877.11 | 5430I |
| Mlses - Elktn And Tygnd 345 | Tyler Northwest - Shamburger Switch 138kV | 10 | $17,839.59 | 09TPIT0122 |
| Ph Robinson to Center 345 kV | Cedar Bayou Plant - Strang 138kV | 3 | $13,076.97 |  |
| Mercers Gap Sw to Comanche Switch (Oncor) 138 kV | Camp Bowie (Oncor) - Brownwood Switch 138kV | 3 | $12,176.57 |  |
| Lobo 2\_345\_138 345/138 kV | Garza - Roma Switch 138kV | 3 | $7,731.06 |  |
| Eagle Mountain 2 Compressor Station to Eagle Mountain Poi (5)138/138/138/138/138 kV | Eagle Mountain Ses - Wagley Robertson 138kV | 5 | $2,476.32 | 15TPIT0085 |

## Generic Transmission Constraint Congestion

There were four days of activity on the Laredo GTC, four days of activity on the Zorillo – Ajo GTC, two days on the Panhandle GTC, and twenty-five days on the Liston GTC in August. There was no activity on the remaining GTCs during the Month.

Note: This is how many times a constraint has been activated to avoid exceeding a GTC limit, it does not imply an exceedance of the GTC occurred or that the GTC was binding.

## Manual Overrides for August

There were no manual overrides for the month of August 2016.

## Congestion Costs for Calendar Year 2016

The following table represents the top twenty active constraints for the calendar year based on the estimated congestion rent attributed to the congestion. ERCOT updates this list on a monthly basis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Binding Element** | **# of 5-min SCED Intervals** | **Estimated Congestion Rent** | **Transmission Project** |
| Ph Robinson At1l\_H (3)345/138 KV | Meadow AT1 345/138kV | 1,470 | $ 37,410,531.94 | 4708 |
| Villa Cavazos to Military Highway Aep (2)138/138 KV | Los Fresnos - Loma Alta Substation 138kV | 3,272 | $ 26,026,381.24 |  |
| Rns-Rtw & Sng-Tb 345kv | Singleton - Zenith 345kV | 5,780 | $ 25,577,004.88 | Houston Import Project |
| Jim Christal Substation to West Denton 138 KV | Fort Worth Subsation - West Denton 138kV | 1,353 | $ 10,963,169.35 |  |
| Rnksw-W\_Dent&Lwssw-Krwsw 345kv | Fort Worth Subsation - West Denton 138kV | 1,774 | $ 10,027,611.63 | 4252 |
| Jewet-Sng 345kv | Btu\_Jack\_Creek - Twin Oak Switch 345kV | 6,629 | $ 9,287,572.08 | Houston Import Project |
| Hcksw-Allnc&Rnksw 345kv | Eagle Mountain Ses - Morris Dido 138kV | 1,420 | $ 8,755,553.47 |  |
| Basecase | Panhandle GTC | 5,518 | $ 8,114,710.88 | Panhandle Upgrade |
| Bm-Sr73 & Sr81 138kv | Bellaire - San Felipe 138kV | 196 | $ 7,119,922.62 | 4703 |
| Rosen Heights to Eagle Mountain Compressor (5)138/138/138/138/138 KV | Rosen Heights Tap 2 - Morris Dido 138kV | 857 | $ 6,945,775.57 | 4252 |
| Meadow to Ph Robinson 345 KV | Meadow AT1 345/138kV | 89 | $ 6,552,987.55 | 4708 |
| Basecase | Valley Import | 110 | $ 6,494,964.50 | LRGV (lower Rio Grande Valley) Import Project |
| Fort Worth Subsation to West Denton 138 KV | Jim Christal Substation - West Denton 138kV | 1,498 | $ 5,947,372.00 |  |
| Lwssw-Krwsw&Rnksw 345kv | Fort Worth Subsation - West Denton 138kV | 791 | $ 5,462,367.54 |  |
| Hcksw-Allnc&Rnksw 345kv | Rosen Heights Tap 2 - Morris Dido 138kV | 805 | $ 5,063,292.44 | 4252 |
| South Carbide to Loma Alta Substation 138 KV | La Palma - Villa Cavazos 138kV | 505 | $ 5,060,645.62 | 4490 |
| Mason Road to Obrien 138 KV | Betka - Hockley 138kV | 257 | $ 4,451,883.67 | 3682A,3682,3682C |
| South Texas # 1 & # 2 | Marion - Clear Springs 345kV | 18 | $ 4,402,597.52 |  |
| Nelson Sharpe to Ajo 345 KV | Javalina Tap - Molina 138kV | 4,406 | $ 4,208,950.27 | 4401 |
| Ph Robinson At4\_H (3)345/138 KV | Meadow AT1 345/138kV | 62 | $ 3,994,537.45 | 4708 |

# System Events

## ERCOT Peak Load

The unofficial ERCOT peak load for the month was 71,197 MW and occurred on August 11th during hour ending 17:00.

## Load Shed Events

8/23/16 - Loss of approximately 400 MW of Load in Kluge (KL) and Cyfair (CYF) stations. This was not an ERCOT directed load shed event.

## Stability Events

None.

## Notable PMU Events

ERCOT analyzes PMU data for any significant system disturbances that do not fall into the Frequency Events category reported in section 2.1. The results are summarized in this section once the analysis has been completed.

There were no reportable events in August.

## TRE/DOE Reportable Events

None.

## New/Updated Constraint Management Plans

None.

## New/Modified/Removed SPS

* On 8/3/16 a market notice was sent for the modification of the Permian Basin SPS.
* On 8/31/16 a new Wirtz SPS was added.
* On 8/24/16 a market notice was sent out for the removal of the Allen Switch SPS to be retired on 9/2/16.

## New Procedures/Forms/Operating Bulletins

None.

# Emergency Conditions

## OCNs

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 8/2/16 10:19 | OCN issued due to capacity insufficiency |

## Advisories

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 8/2/16 14:02 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/3/16 13:08 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/4/16 15:09 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/5/16 14:32 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/6/16 13:57 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/10/16 14:12 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/11/16 13:30 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/17/16 12:21 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/24/16 14:46 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/25/16 13:17 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/27/16 13:02 | Advisory issued due to Physically Responsive Capability being less than 3,000MW. |
| 8/31/16 13:30 | Advisory issued due to postponed DAM solution |

## Watches

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 8/25/16 08:35 | Watch issued due to SCED failure |
| 8/27/16 13:50 | Watch issued due to Physical Responsive Capability being less than 2,500 MW. |

## Emergency Notices

None.

# Application Performance

## TSAT/VSAT Performance Issues

None.

## Communication Issues

None.

## Market System Issues

8/25/16 – A watch was issued due to a SCED failure. This resulted in ERCOT performing an un-scheduled site failover of its Energy Market Management System.

8/31/16 – DAM was postponed due to a long solution time.

# Appendix A: Real-Time Constraints

The following is a complete list of constraints activated in SCED for the month of August. Full contingency descriptions can be found in the Standard Contingencies List located on the MIS secure site at Grid 🡪 Generation 🡪 Reliability Unit Commitment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Constrained Element** | **From Station** | **To Station** | **# of Days Constraint Active** |
| BASE CASE | LISTON | n/a | n/a | 25 |
| DRNS\_TB5 | SNGZEN99\_A | SNG | ZEN | 18 |
| DJEWSNG5 | JK\_TOKSW\_1 | TOKSW | JK\_CK | 16 |
| SLAQLOB8 | BRUNI\_69\_1 | BRUNI | BRUNI | 16 |
| DFERPAL8 | 38T365\_1 | WIRTZ | FLATRO | 15 |
| SLOCSPN9 | DENTON\_AT1 | DENTON | DENTON | 11 |
| SJMCW\_D8 | FTW\_W\_DE\_1 | W\_DENT | FTWORTH | 11 |
| DTRCELK5 | 1760\_\_A | SHBSW | TYLNW | 10 |
| SFTWW\_D8 | AIR\_W\_DE\_1 | W\_DENT | JMCRSTL | 9 |
| DFL\_MAR8 | BETHK\_66\_A | HK | BET | 7 |
| XLWS58 | 1065\_\_L | EULES | GRHWY | 6 |
| DWH\_STP5 | BONIVI\_RINCON1\_1 | RINCON | BONIVIEW | 6 |
| SBRAUVA8 | HAMILT\_MAVERI1\_1 | HAMILTON | MAVERICK | 6 |
| DCHBJOR5 | ATKRIN87\_A | RIN | ATK | 6 |
| SGILNU78 | GILA\_MORRIS1\_1 | GILA | MORRIS | 6 |
| DSTEXP12 | BLESSI\_LOLITA1\_1 | LOLITA | BLESSING | 5 |
| SEMMEM28 | 6271\_\_A | EMSES | WGROB | 5 |
| DHCKRNK5 | 6270\_\_A | EMSES | EGPOI | 4 |
| SMDLODE5 | 6475\_\_C | ODEHV | TROTP | 4 |
| BASE CASE | ZO\_AJO | n/a | n/a | 4 |
| XDUN58 | AUSTRO\_AT2H | AUSTRO | AUSTRO | 4 |
| BASE CASE | LAREDO | n/a | n/a | 4 |
| DGIBSNG5 | 260\_A\_1 | JEWET | SNG | 3 |
| SPHRCTR5 | CBYRNG87\_A | CBY | RNG | 3 |
| DCHBJOR5 | BRNLAN86\_A | LAN | BRN | 3 |
| XLOB58 | GARZA\_ROMA\_S1\_1 | GARZA | ROMA\_SW | 3 |
| SSPNDEN9 | HIC\_LOCU\_1 | LOCUST\_D | HICKRY\_D | 3 |
| DRNS\_TB5 | SNGZEN98\_A | SNG | ZEN | 3 |
| DCHBJOR5 | BRNWIN86\_A | BRN | WIN | 3 |
| SZEPCMN8 | 670\_\_B | BRNSW | CMPBW | 3 |
| SE3S18 | PLESNTN\_TORDLO\_1 | TORDILLO | PLSNTOS | 3 |
| DI\_DWHI8 | RINCON\_WHITE\_2\_1 | RINCON | WHITE\_PT | 2 |
| DKOCNUE8 | CHAMPL\_WEIL\_T1\_1 | WEIL\_TRC | CHAMPLIN | 2 |
| DCHB\_NB5 | CV\_LH\_03\_A | LH | CV | 2 |
| DWLV89N8 | 3410\_\_A | ELVSW | REGST | 2 |
| SLWSLW38 | 1065\_\_L | EULES | GRHWY | 2 |
| SBEVASH8 | BIG\_COTU\_1 | COTULAS | BIGWELS | 2 |
| XLOB58 | ASHERT\_CATARI1\_1 | ASHERTON | CATARINA | 2 |
| SPHRCTR5 | ATKRIN87\_A | RIN | ATK | 2 |
| DMARPA\_8 | 38T365\_1 | WIRTZ | FLATRO | 2 |
| SSWDMGS8 | 6940\_\_C | SWTWR | ROSCO | 2 |
| SSWDMGS8 | 6780\_\_A | ESKSW | LONGWRTH | 2 |
| BASE CASE | PNHNDL | n/a | n/a | 2 |
| SWILJA28 | WISECNTY\_JCKCN\_1 | JACKCNTY | WISECNTY | 1 |
| SGARROM8 | GARZA\_69A1 | GARZA | GARZA | 1 |
| STNWRIO8 | M\_69\_N1\_1 | TNPINION | TNFS | 1 |
| XWLV158 | 3416\_\_A | NORSW | CHROW | 1 |
| SHNRNCD8 | 1350\_\_A | NCSTP | LUFKN | 1 |
| DCC3\_NED | ASHERT\_CATARI1\_1 | ASHERTON | CATARINA | 1 |
| SREDMCC8 | 102T375\_1 | MCCALA | RNRD12 | 1 |
| XHUT58 | 1666\_\_B | GILLCR | PFLGV | 1 |
| DFPPFAY5 | 190T152\_1 | GIDEON | WINCHE | 1 |
| SBATPEA8 | 2584\_1 | DOWNIES | UVALDE | 1 |
| DLWSRNK5 | FTW\_W\_DE\_1 | W\_DENT | FTWORTH | 1 |
| SCOLPAW5 | COLETO\_KENEDS1\_1 | COLETO | KENEDSW | 1 |
| DDUNLOS5 | AUSTRO\_AT2H | AUSTRO | AUSTRO | 1 |
| SE3S18 | BIG\_FOOT\_69A1 | BIG\_FOOT | BIG\_FOOT | 1 |
| SFORYEL8 | FORTMA\_MASN1\_1 | FORTMA | MASN | 1 |
| XFOR89 | HEXT\_YELWJC1\_1 | YELWJCKT | HEXT | 1 |
| DSNGZEN5 | BETHK\_66\_A | HK | BET | 1 |
| SENSEN28 | 941\_\_C | ENWSW | ENSSO | 1 |
| DLWSRNK5 | 570\_B\_1 | POCKRUSC | CRNTH | 1 |
| SLCSTH25 | 505\_\_A | THSES | SAMSW | 1 |
| SBREHIG8 | 367T347\_1 | MAXZUE | GAYHIL | 1 |
| XRNK58 | RNKSW\_MR1L | RNKSW | RNKSW | 1 |
| BASE CASE | RANDAD\_ZAPATA1\_1 | RANDADO | ZAPATA | 1 |
| DHILELM5 | MAR\_SKY\_1 | MARION | SKYLINE | 1 |
| SLAQLOB8 | FRE\_BRUN\_1 | BRUNI | FREERS | 1 |
| BASE CASE | LV1BL\_1 | LV1 | LV1 | 1 |
| SRDODES8 | 940\_\_C | ENWSW | WXHCH | 1 |
| DCHBJOR5 | EXNLH\_03\_A | EXN | LH | 1 |