DISCLAIMER

This report is for ERCOT internal distribution only and should not be provided to any party outside ERCOT.

EVENT DETAILS

On January 10th, 2014, at about 8:30 am, after logging on into RTDMS system, ERCOT Operations Engineers noticed oscillations on the RTDMS displays. Since the oscillations were showing up only at PMU1 close to a wind farm as shown in Fig1, ERCOT looked at the generation at the Wind Farm unit close to this PMU1. It was generating about 56 MW (Fig2). These oscillations were showing up even though there was no line outage at this wind warm (In October 2013, we had observed oscillations due to a line outage at this wind warm).

In order to reduce the oscillations, ERCOT advised the Wind Farm unit to turn OFF their AVR. This did not help to reduce the oscillations. In order to reduce oscillations, they were curtailed to 45 MW output. This reduced the oscillations to some extent. Since the oscillations did not go away completely, they were further constrained to 40 MW and the oscillations finally went away as shown in Fig3 and Fig4. It was found that oscillations were present in the system since 18:15 pm of January 9th, 2014. Analysis of these oscillations using Phasor Grid Dynamics Analyzer (PGDA) tool indicated that the dominant mode that was present was 3.3 Hz as shown in Fig 5 and 6. The voltage oscillations were having magnitude of about 1kV as shown in Fig7. The oscillations were present till the next morning. Fig 7 and 8 show the oscillations present in the morning of January 10th, 2014 until the unit had been curtailed to less than 40 MWs. ERCOT Operations contacted the plant operator at the Wind Farm to determine the cause of oscillations. It was discovered that some updates were made to the settings for the system controller on January 9th, which matched the time of initial observation of the oscillations. After ERCOT informed the Wind Farm Operators about the oscillations, they pulled back the updates which finally stopped the oscillations. After that, no oscillations were observed even when the plant was generating at greater than 50 MWs.
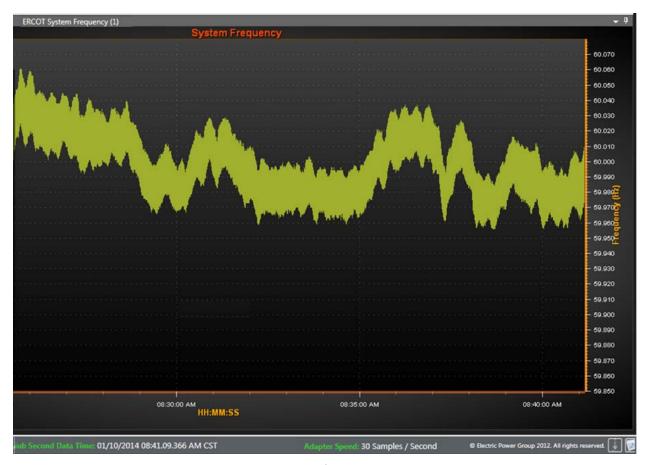
Fig1. Frequency at PMU1 on RTDMS System on 10th Jan 2014.

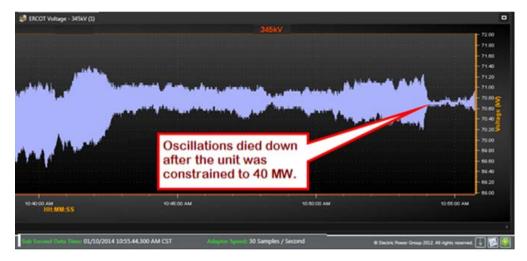Fig2: Generation at the Wind Farm on 10th Jan, 2014 on 10th Jan 2014.

Fig3: Reduction of oscillations after constraining the plant to 40 MW on 10th Jan, 2014.
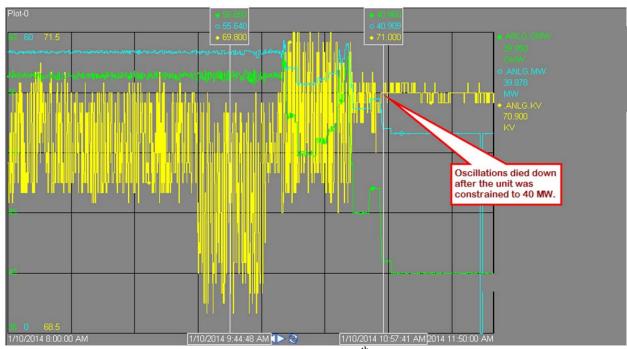

Fig4: EMS trend for generation at the Wind Farm on 10th Jan, 2014.
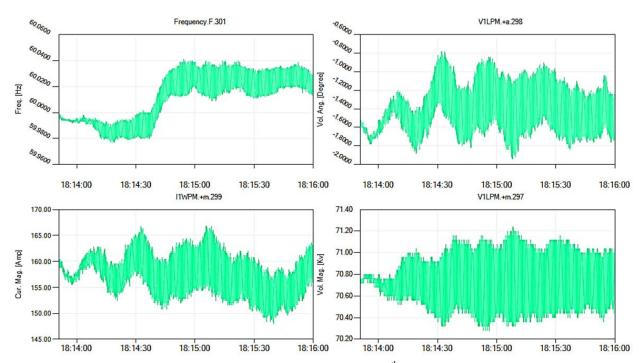
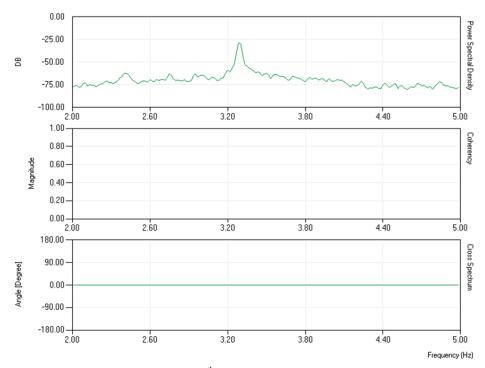Fig 5: The frequency, voltage and Currents captured by the PMU1 on 9th January, 2014

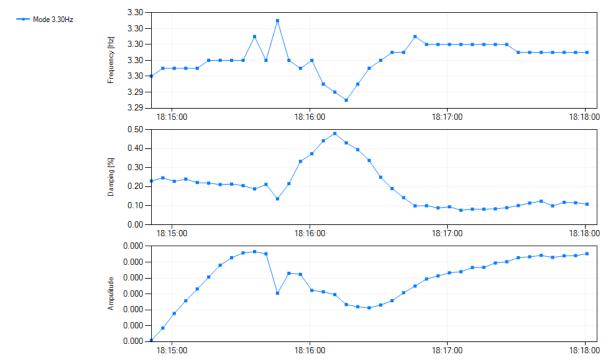Fig 6a: Modal Analysis of the Frequency data using PGDA on 9th January, 2014.

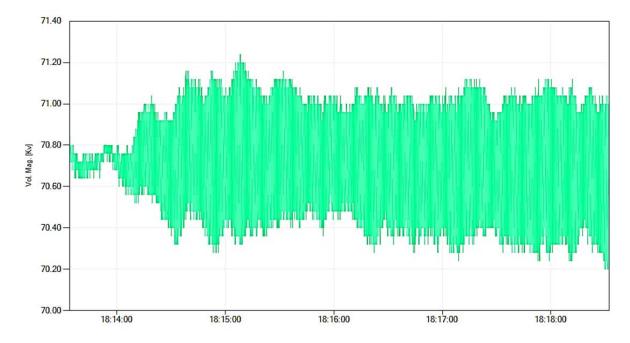Fig 6b: Modal Analysis of the Frequency data using PGDA on 9th Jan 2014.
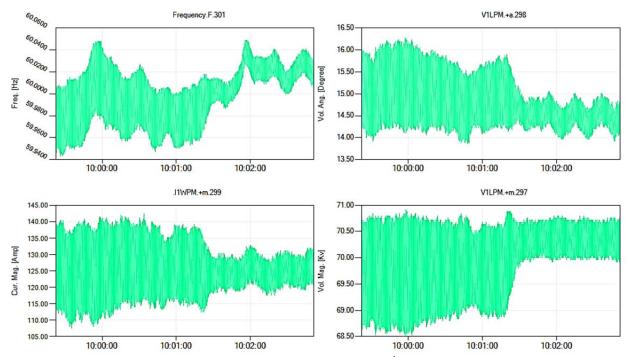

Fig7: Voltage Oscillations at PMU1

Fig.8: The frequency, voltage and Currents captured by the PMU1 on 10th January, 2014
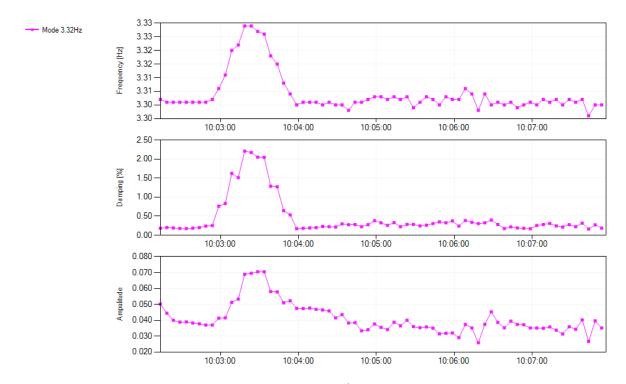

Fig 9: Modal Analysis of the Frequency data using PGDA on 10th January, 2014.