# High Error Day Analysis for February 2010

For February of 2010, ERCOT identified the 3rd, 5th, 7th, 8th, and 20th as days with unusually high wind generation forecast errors to be investigated. This report presents an analysis of each of the days identified. Some data was not readily available for use in the verification for this month due to the cleaning of a database.

On February 3, the wind generation forecast had a gradual up ramp between 4:00 am and 10:00 pm. The observed wind generation ramped up more steeply between midnight and 2:00 pm and then ramped down through the end of the day (figure 1). The forecast was too high at the beginning and end of the day with a substantial under forecast of up to 2600 MW during the middle of the day.

The weather pattern responsible for the winds consisted of a low pressure area over southern Arizona and New Mexico, a second low over Colorado, and a large high pressure centered over the upper Midwest (figure 2). The winds ramped up as the pressure gradient between the high and low pressure increased during the morning with the approach of the low pressure and weakened as the high pressure moved off to the northeast late in the day while the low moved slowly through the mountains. The physical models did not correctly forecast the details of the interaction of the low and high pressures leading to wind speeds that were too light for most of the day. It should be noted that the error in wind speed required to produce the observed generation error was not very large as the same pattern was affecting most of the wind generation units and wind speeds were in the middle portion of the power curve over much of the region.

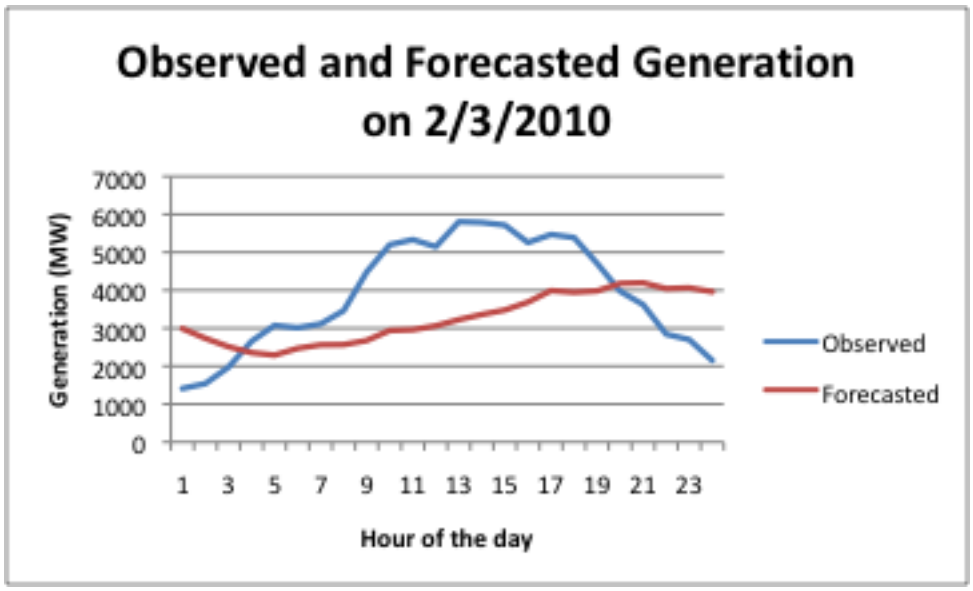


Figure 1: Aggregate observed and forecast wind generation on February 3, 2010.

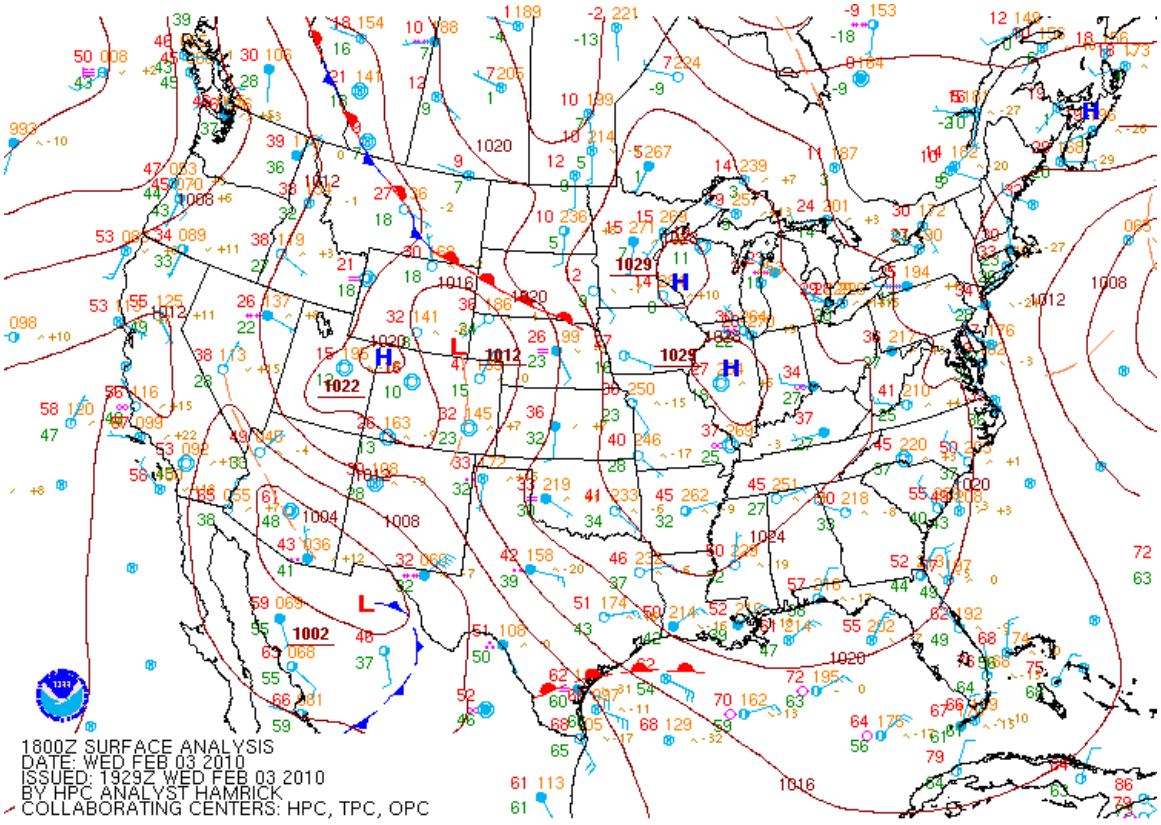


Figure 2: Depiction of the surface weather over the United States at 12:00 pm CST on February 3, 2010.

On February 5, there was a large over forecast of wind generation during the early morning hours. From 10:00 am through the end of the day, the forecast was close to the observed generation (figure 3).

A low pressure along the eastern Rocky Mountains was moving into western Texas as the day began (figure 4). During the morning hours the original low pressure dissipated as it's energy was transferred to a strong low pressure developing along the Gulf Coast (figure 5). The physical models had a more intense low pressure moving through the wind production regions with higher winds than actually occurred. The details of secondary low pressure developments such as this are often quite difficult for physical weather models to forecast. Such developments are more frequently observed over the east coast of the United States.

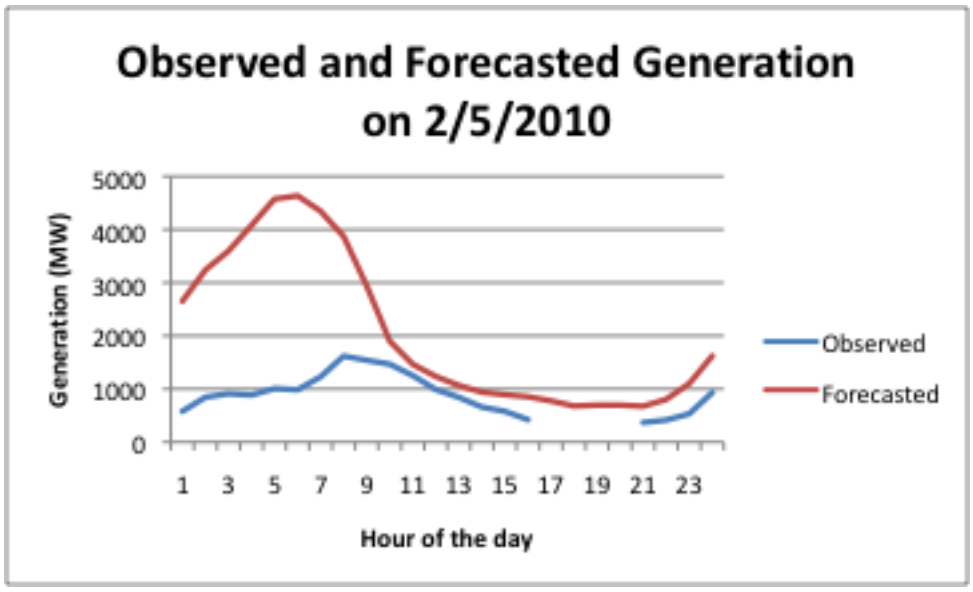


Figure 3: Aggregate observed and forecast wind generation on February 5, 2010.

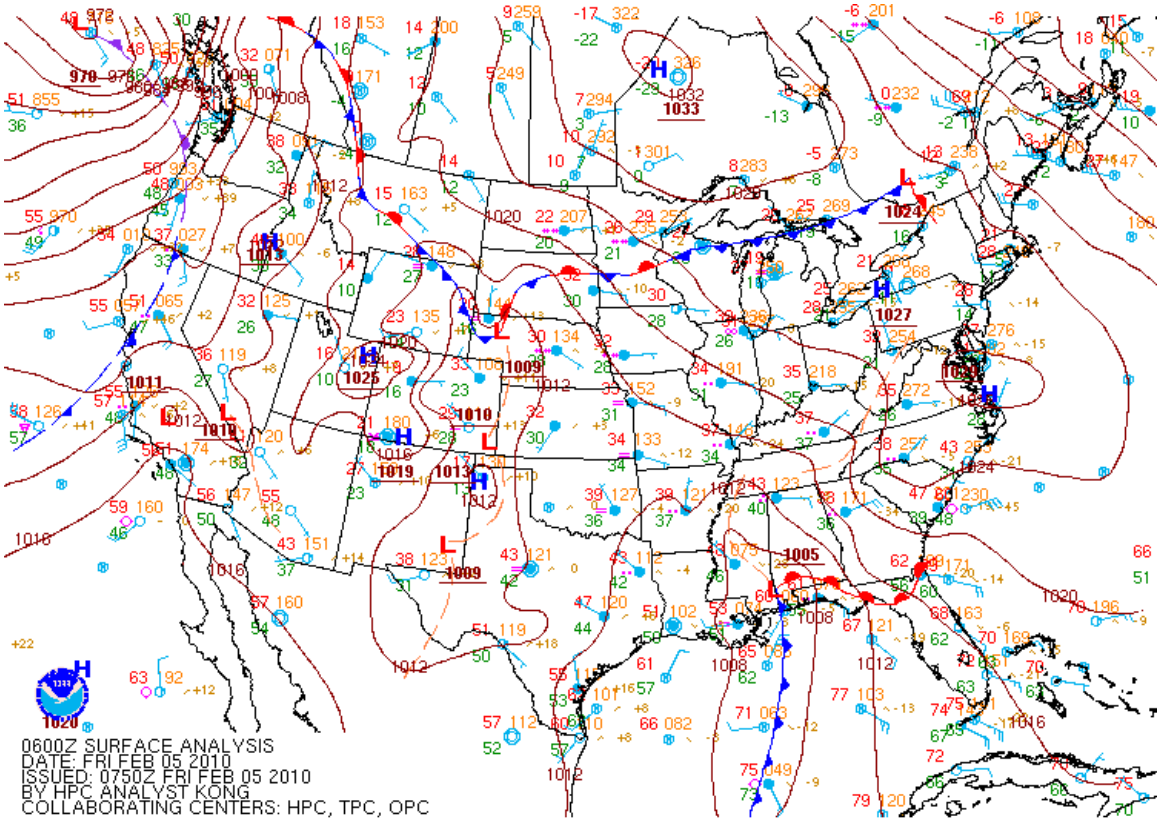


Figure 4: Depiction of the surface weather over the United States at 12:00 am CST on February 5, 2010.

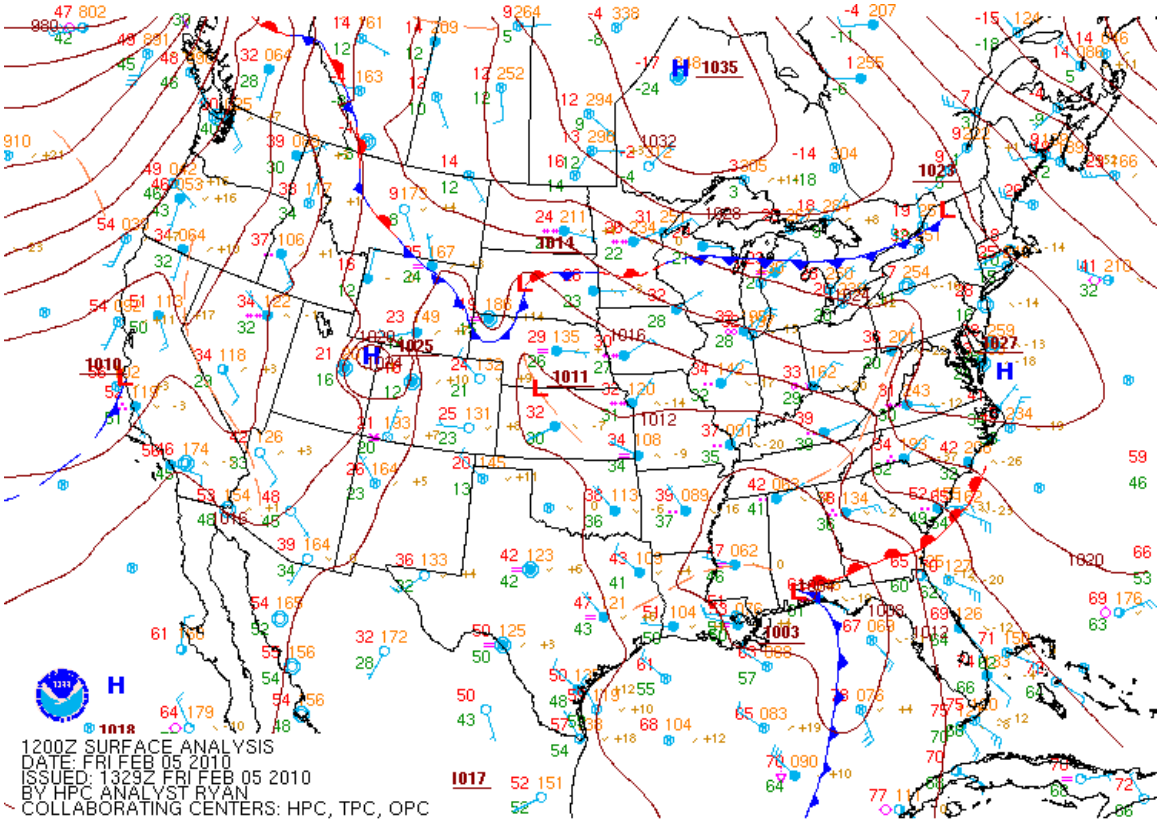


Figure 5: Depiction of the surface weather over the United States at 6:00 am CST on February 5, 2010.

On February 7, wind generation forecast ramped up gradually during the first half of the day and then much more steeply between 2:00 pm and 11:00 pm reaching a peak of near 6000 MW. The observed generation was flat near 2000 MW for most of the day (figure 6).

The weather pattern on February 7 was similar to that on February 3, with a low pressure over the Four Corners region and a high pressure to the northeast. A second low was located over the northern Plains and was moving gradually southward (figure 7). The movement of the northern low displaced the high pressure to the east and created a broad region of low pressure gradient over the Plains. The physical model forecasts were for higher pressures over the Plains leading to an increasing pressure gradient (and stronger wind speeds) over the wind generation regions as the low pressure over the Four Corners region moved eastward late in the day. The northern low reduced the expected pressure gradient and the wind speeds were lower than expected.

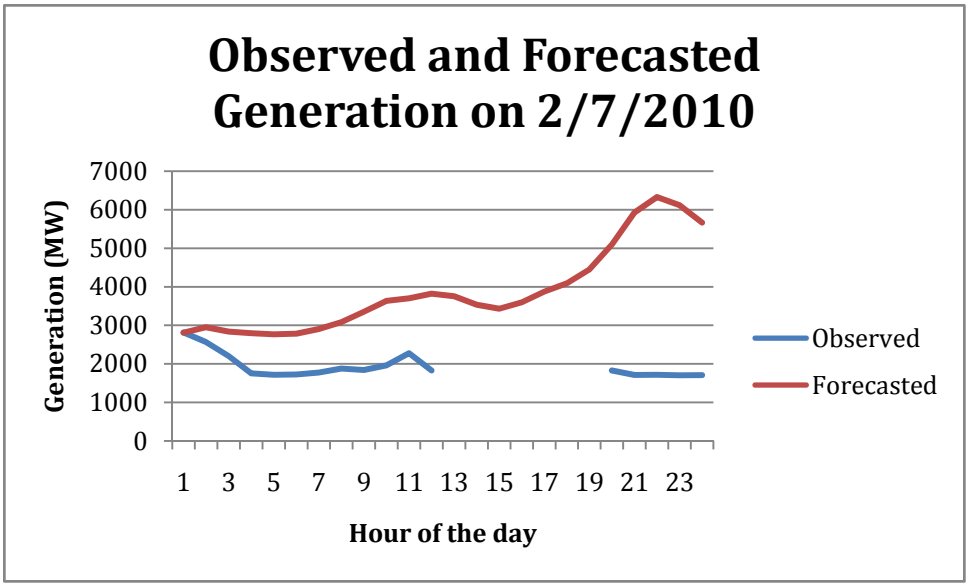


Figure 6: Aggregate observed and forecast wind generation on February 7, 2010.

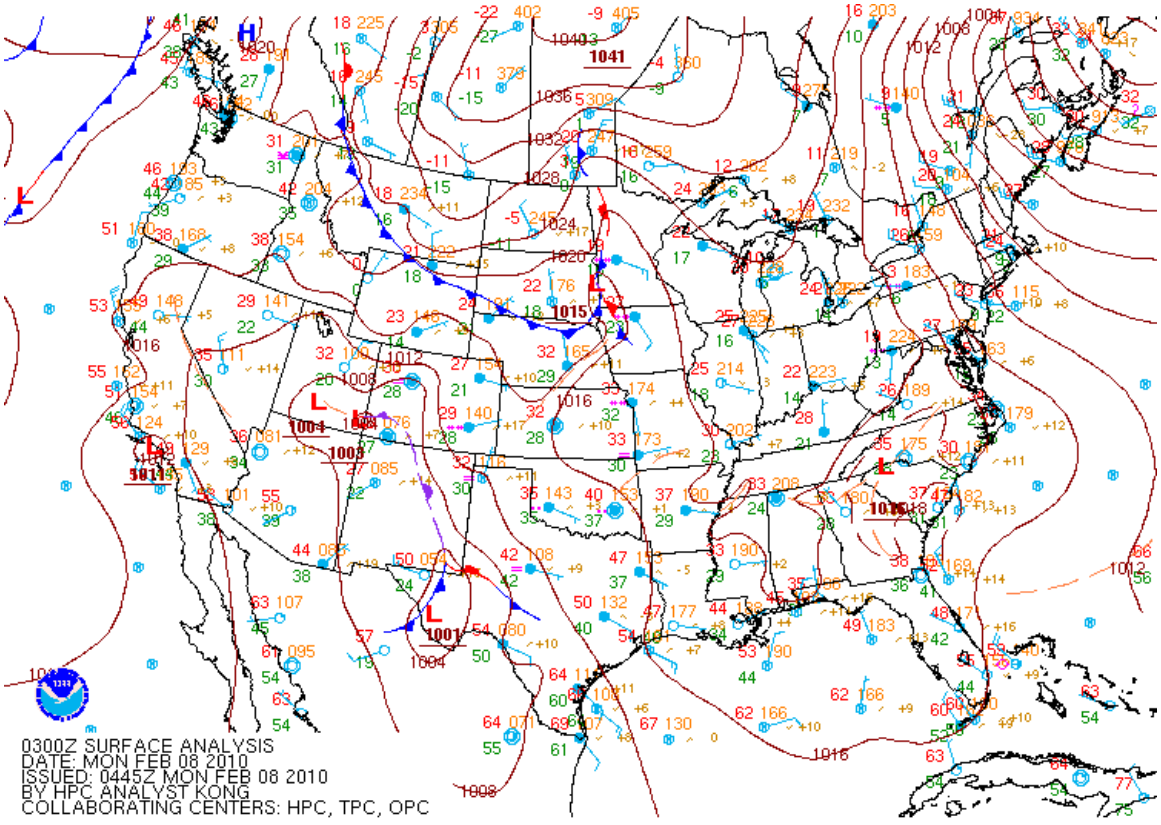


Figure 7: Depiction of the surface weather over the United States at 9:00 pm CST on February 7, 2010.

The forecast errors on February 8 were caused by the same mechanism observed on February 7. The day started out with large forecast errors and then the error decreased, as the wind generation forecast stayed nearly constant while the actual generation increased gradually (figure 8). The forecast error at the beginning of the day on February 8 was much less than that observed at the end of the day on February 7. This is because the model look-ahead time was much less. This demonstrates that model runs closer to an event generally perform better.

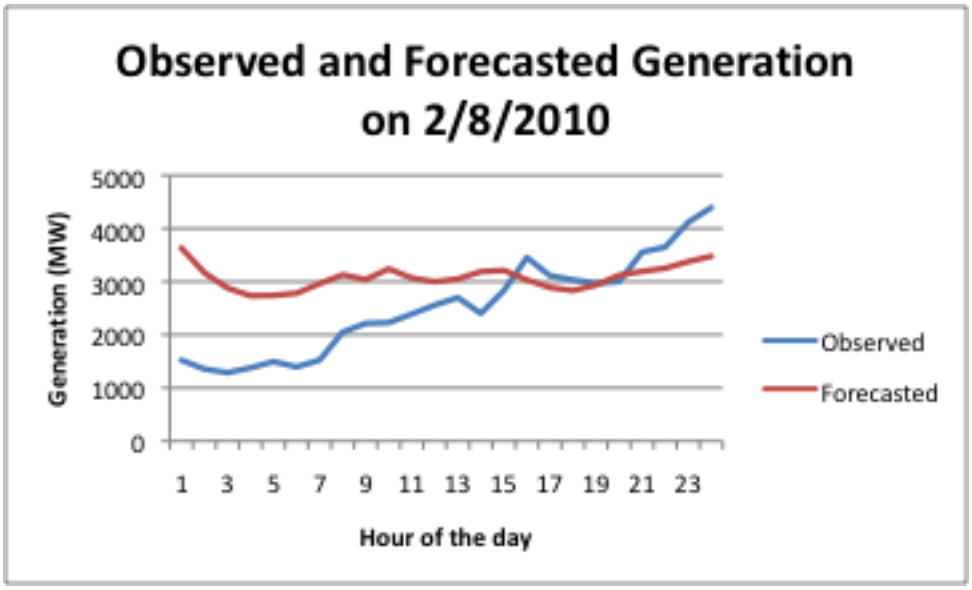


Figure 8: Aggregate observed and forecast wind generation on February 8, 2010.

On February 20, the wind generation forecast was too low during the middle part of the day (figure 9). The maximum error was just under 2000 MW. The forecast had a very significant decrease in generation during the middle part of the day. A much smaller decrease in generation was observed.

During the day on February 20, a front was nearly stationary just south of the Texas Panhandle. The front was located very near the Sweetwater region for much of the day (figure 10). In the immediate vicinity of the front, the winds were light with stronger winds away from the front on either side of it. The large amount of generation concentrated in the Sweetwater region causes small errors in the positioning of a feature like a stationary front to translate into a large generation forecast error.

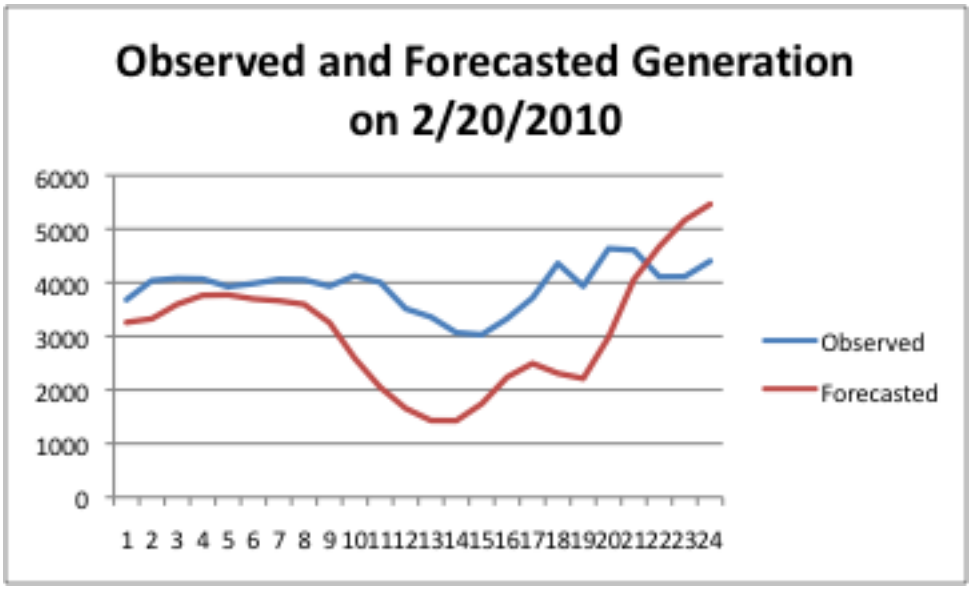


Figure 9: Aggregate observed and forecast wind generation on February 20, 2010.

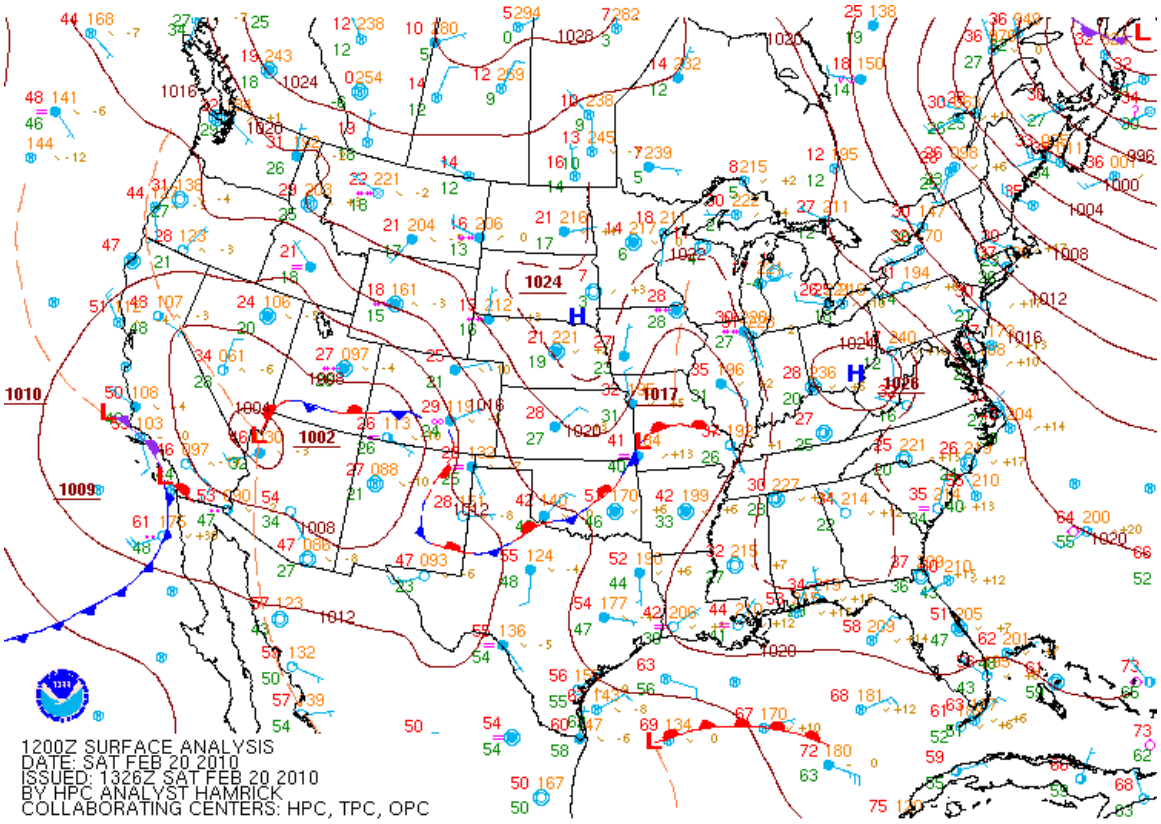


Figure 10: Depiction of the surface weather over the United States at 6:00 am CST on February 20, 2010.