



Wind Power Operational and Market Report Week of Nov 25 to Dec 1, 2007

Thursday, December 13, 2007

1.0 Purpose

Around the world, interest in wind development as a source of renewable energy continues to grow. In Alberta, wind power is part of the diverse mix of generation sources that supplies the growing electricity demands of Albertans. As the amount of wind power on a system grows, so do the operational challenges.

Wind can start, stop or change at any moment. Today wind power is backed up by coal, gas, hydro generation facilities or the interconnections to BC and Saskatchewan using Alberta's competitive electricity markets.

The purpose of the weekly report is to provide industry with graphs and tables that illustrate aspects such as:

- Wind generation versus system load
- Regional diversity of wind generation
- Wind generation in the energy market
- Wind generation forecasts versus actual wind generation

The forecast information comes from the Wind Power Forecasting Pilot Project. The intent is to capture weekly wind power events and break them down from a forecasting perspective in order to educate AESO stakeholders on the capabilities of wind power forecasting. More information about this project can be found on our website at <http://www.aeso.ca/gridoperations/13825.html>.

The AESO anticipates that this report will continue to improve and any feedback is appreciated and feedback can be emailed to AESO stakeholder relations at stakeholder.relations@aeso.ca.

1.1 Weekly Synopsis

There were no reported system operational problems during this timeframe. The reason for this is likely due to the fact that the volume and ramp-rate were absorbed by the energy market and the regulating reserve service. With reference to section 5 of this report, there was ample dispatchable generation above baseload in the energy market during the week.

This week, wind power had an average capacity factor of 22.16%. There were two periods of high wind generation, which involved ramping events. The first ramp down event was captured by some of the forecasts, but not all.

2.0 Wind Generation Statistics

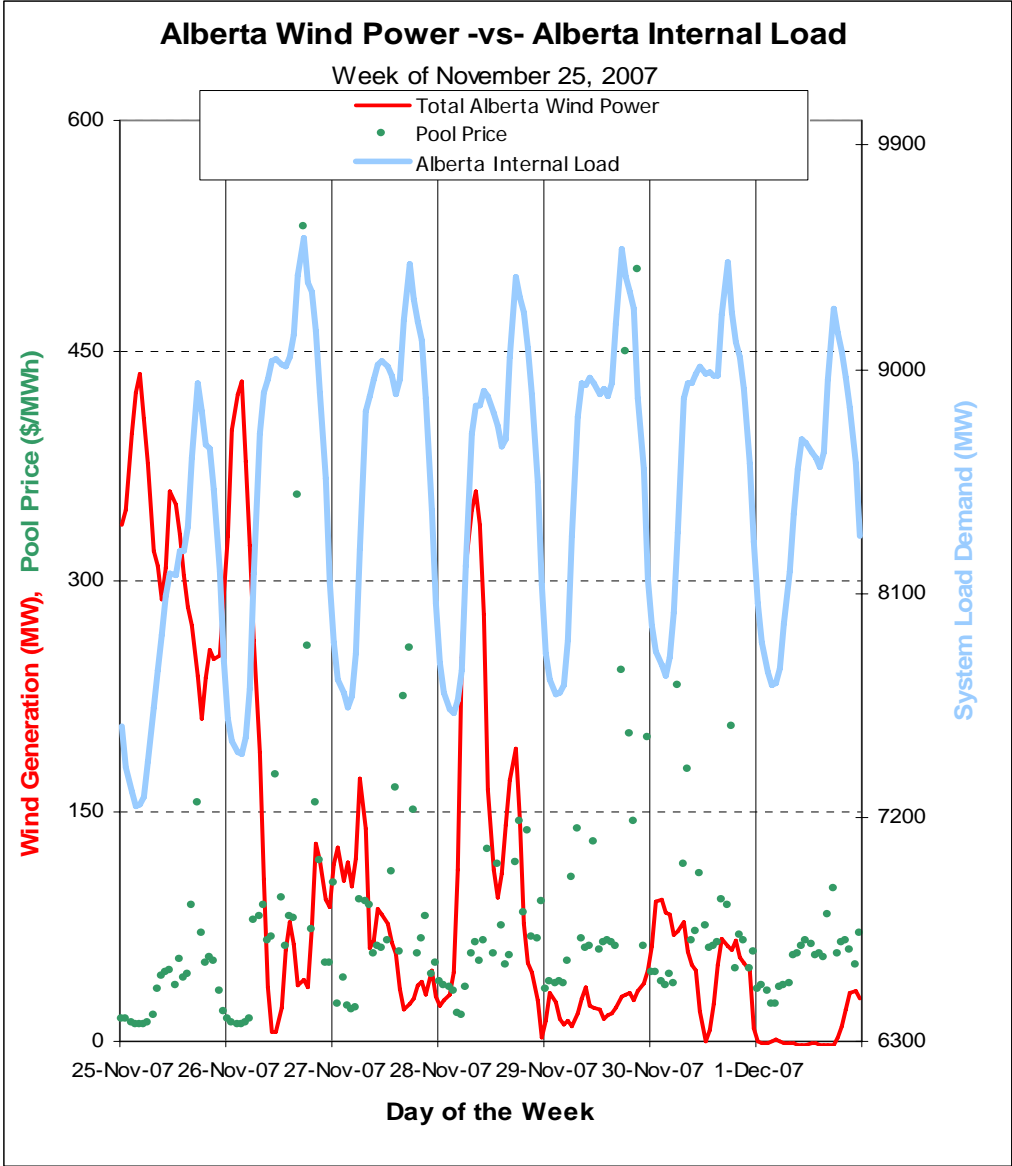
The purpose of this table is to provide daily production statistics as well as any wind power curtailment that occurred. The weekly average capacity factor¹ was 22.16%.

Daily Alberta Wind Generation Statistics								
497MW of Wind Power Currently Operational								
	Wind Generation Statistics						Curtailment Statistics	
Date	Average Off-Peak Wind Gen (MW)	Average On-Peak Wind Gen (MW)	Average Daily Wind Gen (MW)	Minimum Wind Generation (MW)	Maximum Wind Generation (MW)	Average Wind Gen During High Load Hour (MW)	Number of Hours	Number of Affected Wind Power Facilities
25-Nov-07	376	285	316	188	446	224	0	
26-Nov-07	329	68	155	3	453	37	0	
27-Nov-07	110	55	74	15	196	26	0	
28-Nov-07	100	165	143	1	379	138	0	
29-Nov-07	21	26	24	2	54	31	0	
30-Nov-07	70	46	54	0	105	61	0	
1-Dec-07	3	5	4	0	38	3	0	

¹ Capacity factor is determined by averaging all the one minute calculated capacity factors which is: Wind generation/Total installed capacity *100

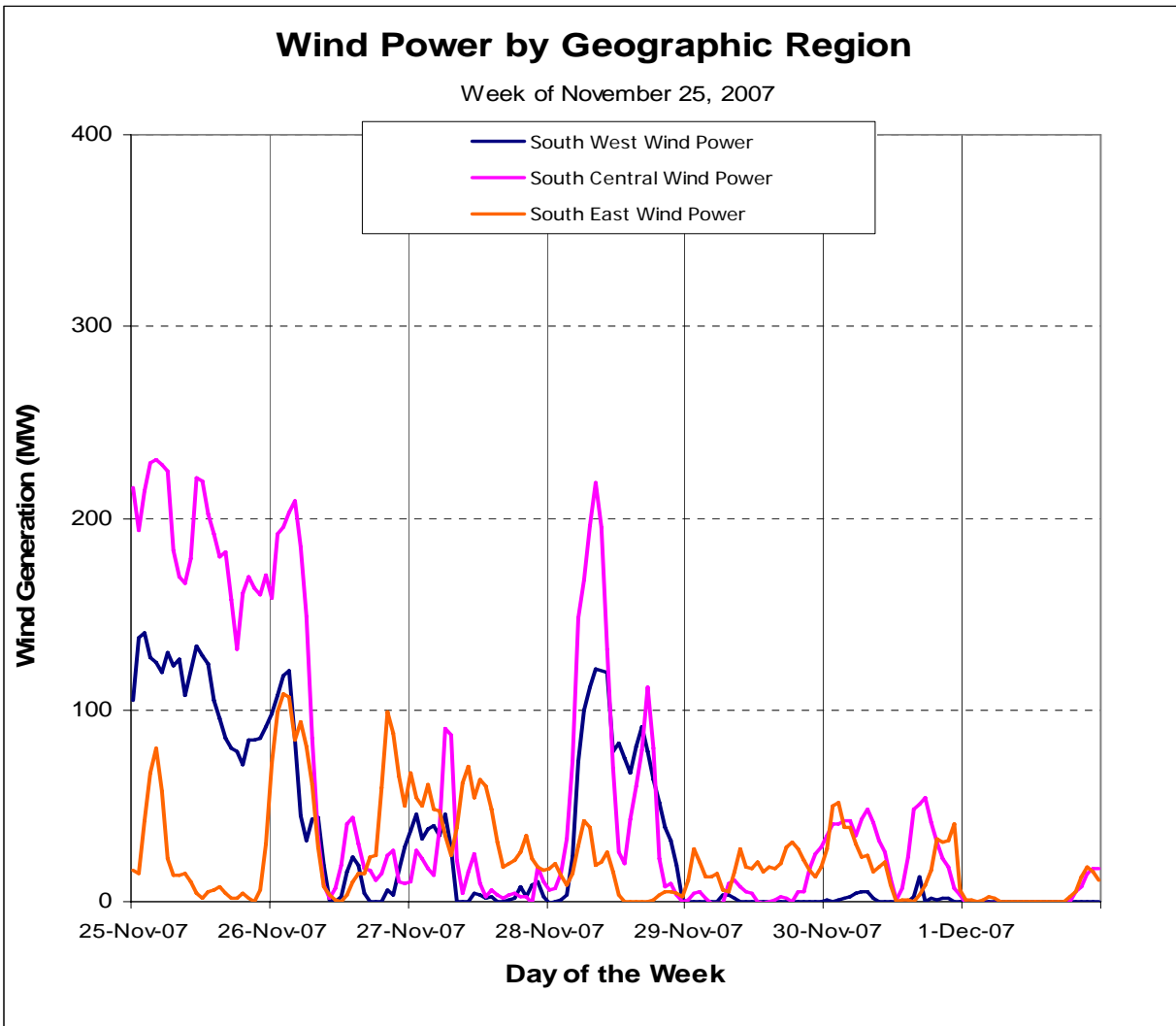
3.0 Wind Generation and System Load

The purpose of the graph is to illustrate how wind power varies with system load and the hourly pool price.



4.0 Wind Diversity in Alberta

The purpose of this graph is to illustrate how wind power varies in the different regions of Alberta.



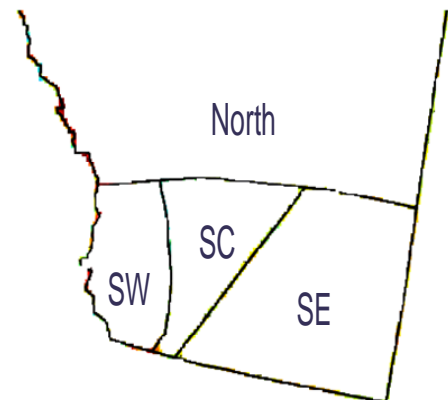
Wind Regions:

South West (SW) Total Installed = 212.3MWs

South Central (SC) Total Installed = 176.2 MWs

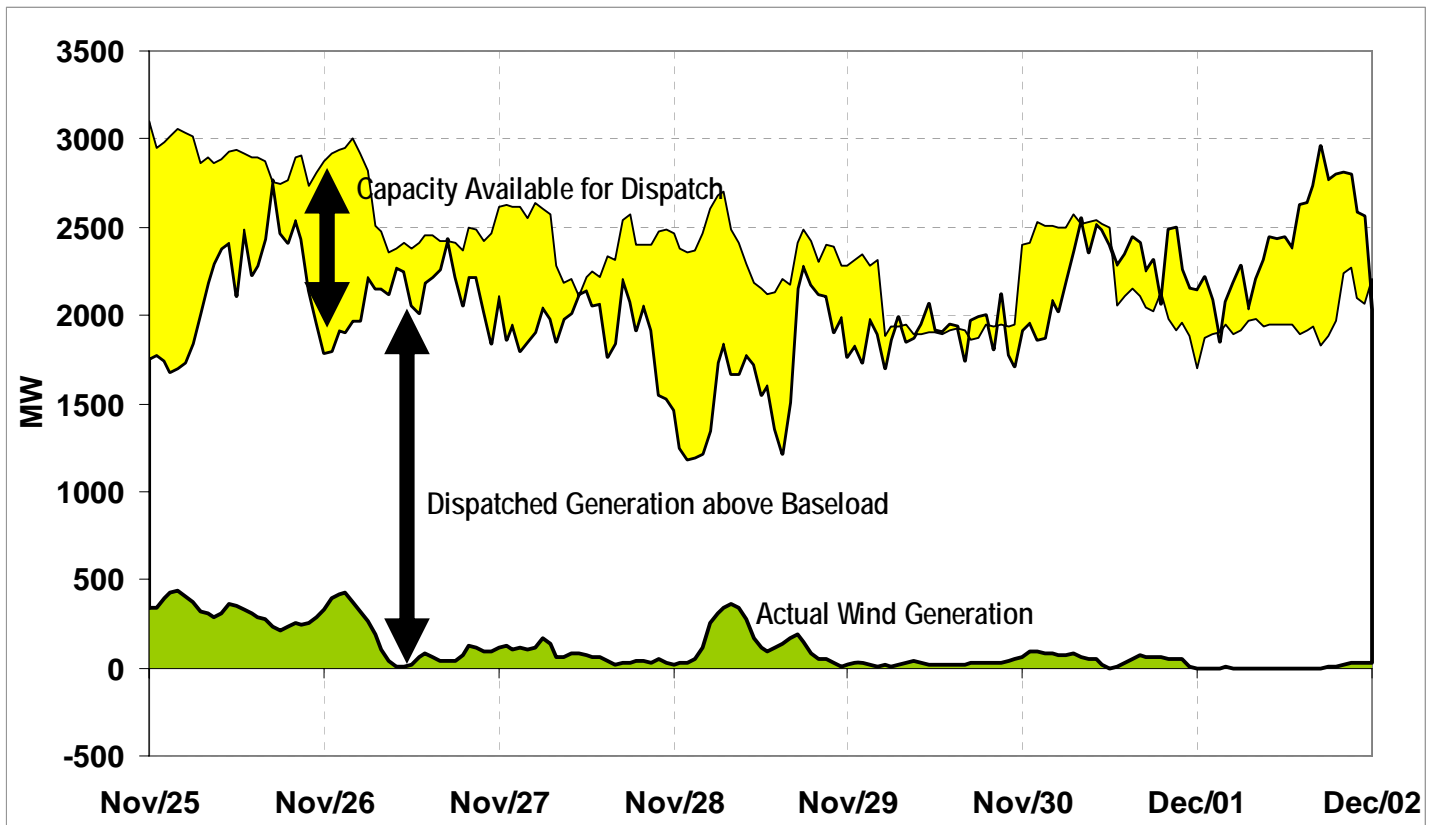
South East (SE) Total Installed = 110 MWs.

There are currently no operational wind facilities in the North



5.0 Generation Supply & Market Dispatch above Baseload Gen (\$0 Offer)

The Purpose of this graph is to demonstrate the variable flexibility that exists in the market place to accommodate wind.



- Based-load generation is the amount of generation from coal, gas or hydro that is either zero dollar offered, Transmission Must Run, small non-dispatchable or behind-the fence industrial generation. This can vary hourly and range between 4500 MW and 6000 MW throughout the year.
- **Note:** The Dispatched Generation above Baseload represents the head room before supply surplus conditions occur.
- **Capacity Available for Dispatch:** Includes unloaded capacity from regulating reserves as well as the amount of offered generation capacity that is not dispatched into the electricity markets.
- **Dispatched Generation above Baseload:** Includes generation produced from the regulating and contingency reserves as well as the amount of non-zero dollar generation dispatched from the energy market merit order.
- **Actual Wind Generation:** The measured amount of all wind generation in Alberta.

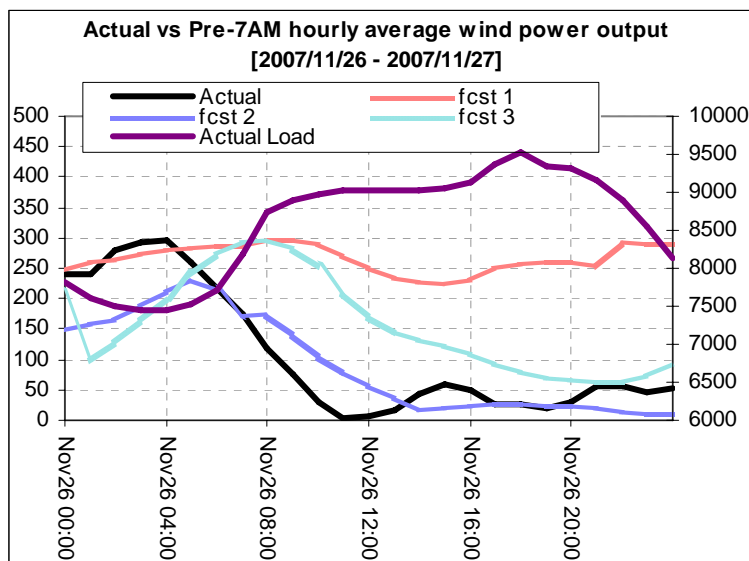
6.0 Wind Power Forecasting Pilot Project

The purpose of this section is to introduce stakeholders to wind power forecasts. The intent is to identify weekly events, and break them down from a forecasting perspective.

Note: the total capacity in the pilot is 350 MW and not the 497 MW currently connected to the Alberta system.

6.1 Event 1

The first event this week was a ramp down in wind power on the morning of November 26 at about 3:00 am. The wind dropped approximately 300 MW over 6 hours. To illustrate this event, the AESO has chosen the following 4 forecasts that were received day ahead, 3 hours ahead, start of the event and 1 hour into this event.

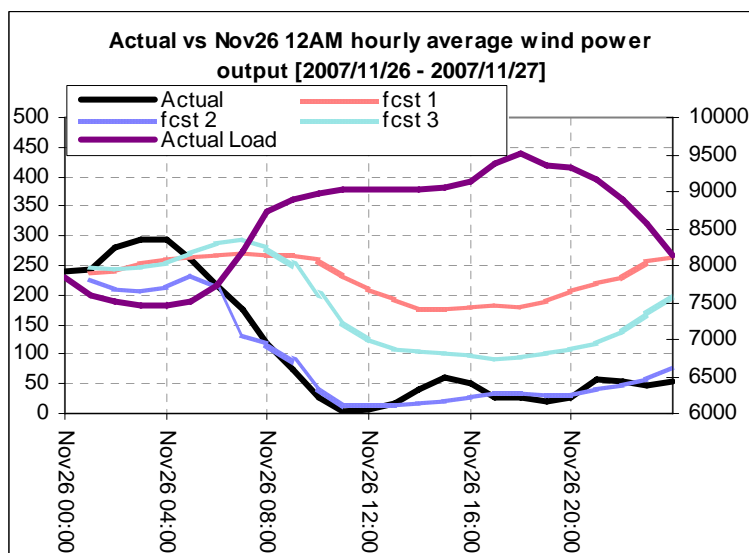


This is the forecast for Nov 26 delivered at 7am on Nov 25. This is the time at which the Ancillary Service forecast for the next day is generated.

F1 – missed the event

F2 – captured well

F3 – time/phase error

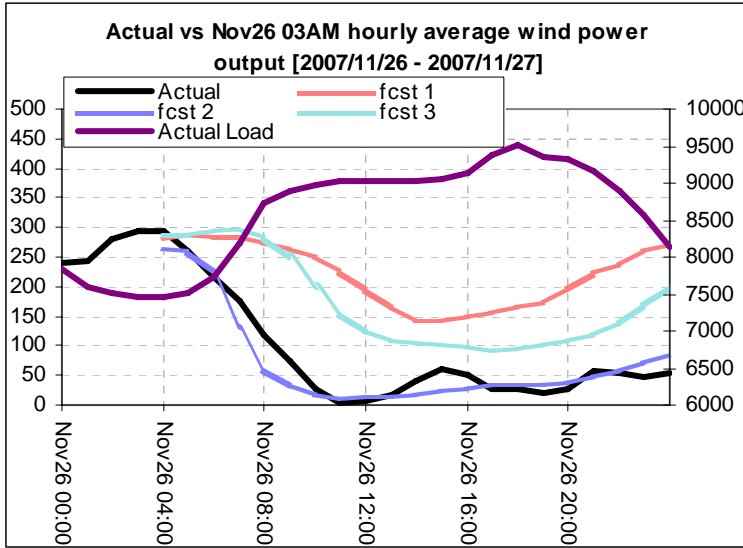


This is the forecast for Nov 26 delivered at 12am (midnight) on Nov 26.

F1 – forecasts a drop but is off in amplitude and phase

F2 – captured well

F3 – still has a time/phase error

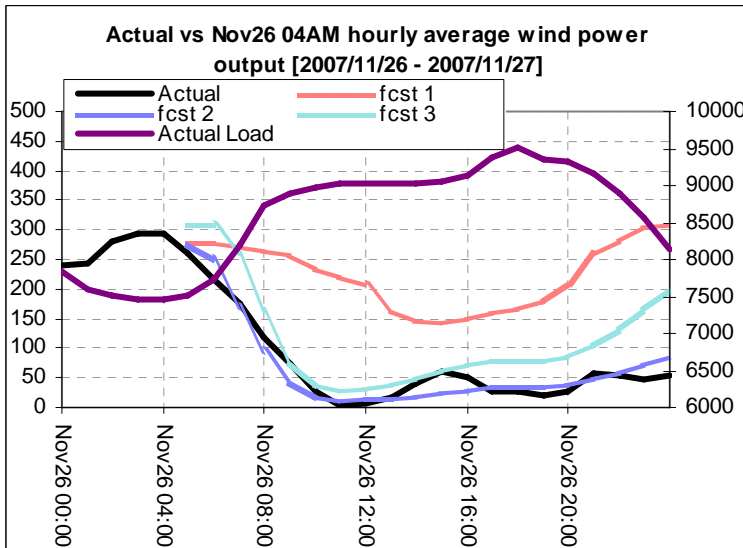


This is the forecast for Nov 26 delivered at 3am on Nov 26.

F1 – still has a time/phase error

F2 – captured well

F3 – still has a time/phase error



This is the forecast for Nov 26 delivered at 4am on Nov 26.

F1 – still has a time/phase error

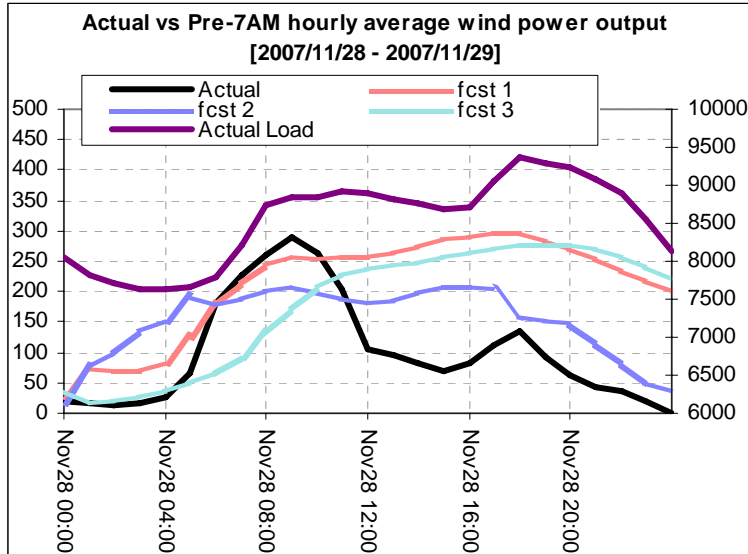
F2 – captured well

F3 – has now captured the event

The AESO intends to post a special event analysis on this event on our website that will include comments from the forecasters, as well as further thoughts from the AESO.

6.1 Event 2

The second event is a ramp up of wind power approximately 300MW over 6 hours on November 28 at 4:00am. To illustrate this event, the AESO has chosen the following 2 forecasts that were received day ahead and 2 hours ahead of this event.

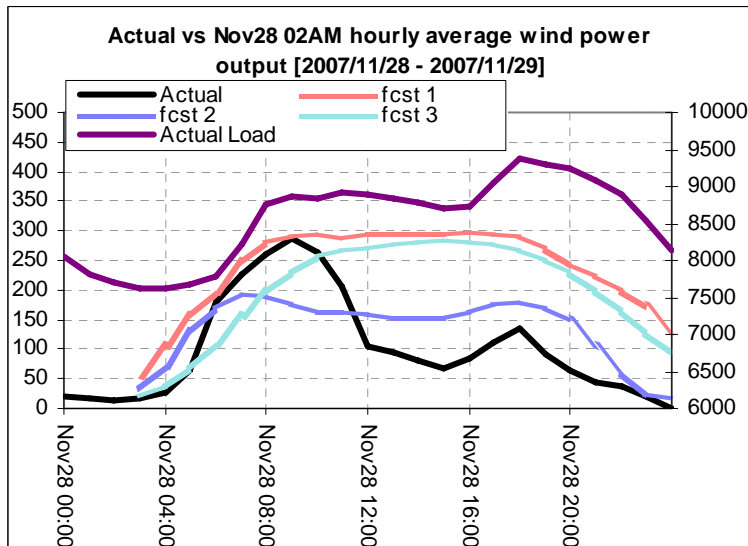


This is the forecast for Nov 28 delivered at 7am on Nov 27. This is the time at which the Ancillary Service forecast for the next day is generated.

F1 – captured the ramp well

F2 – a little early, but captured the ramp

F3 – captures ramp but is a little late



This is the forecast delivered at 2am on Nov 28.

F1 – captured the ramp well on amplitude/phase

F2 – captures phase well, but short on amplitude

F3 – captures ramp well, but a little late