Power System Frequency Disturbance 9 November 2014

Information Flyer

Introduction

This flyer is produced to inform customers of the effects on the South West Interconnected System (SWIS) during the 9 November 2014 frequency disturbance event. Frequency and voltage disturbances in the SWIS during this event may have lead to disruptions in the operation of equipment in use at that time.

The system frequency normally operates between 49.8 and 50.2 hertz.

The information is provided by System Management in its role as the Power System Operator of the SWIS, which includes the dispatching of separately owned generation to meet customer demand.

Pre Event

The SWIS was supplying approximately 1855 megawatts (MW) of demand, which is normal for the prevailing weather conditions. System Management had sufficient generators in reserve to significantly reduce the likelihood of involuntary customer load shedding in the event of losing a generator of up to 320 MW, the largest generator on the SWIS at that time. This is normal practice as any generator may fail without warning.

Event Description

At 7:45 a generator in the Collie Area advised that it had equipment damage and was going to quickly disconnect from the system. It disconnected at 7:52. Six minutes later another generator failed. These two generators had a combined output of 405MW before they stopped operating.

The output of these generators and the system frequency during this event is shown Attachment 1.

During this time, part of another generator also failed reducing its output by about 70 MW.

At 7:58 the system frequency declined to 48.83 hertz. At this point the SWIS is near to entering an unsafe operating mode and automatic safety systems acted which tripped load and thus customers started to experience involuntary load shedding. Customers were shed to bring the demand back to the level of generation available.

Event Finish

Through the automatic response of on-line generation to increase output, the actions of the automatic safety systems to trip load and the starting of additional generating units by System Management, the system frequency returned to the normal range of 49.8 to 50.2 hertz at 8:06. With the frequency restored to normal levels, customer supplies were then restored as generation output increased.

System Management operates the SWIS in such a way to ensure that the return to the normal frequency range occurs within 15 minutes.

Commentary

System Management caters for the instantaneous failure of any one generator in the SWIS. The largest generator during this event at this time was 220 MW. To cater for a larger loss of generation, that is simultaneous failure of multiple generators at once, is expensive.

During this event approximately 475 MW of generation was lost and the online reserve generation was not sufficient, but this level of generation is in accordance with the SWIS Technical Code and Wholesale Electricity Market requirements. As a result involuntary load shedding was required to prevent the SWIS entering an unsafe operating state.

Attachment 1 – System Frequency and Tripped Generator Output (MW)