

Frequency Keeper Selection after June 3, 2008

Introduction

Commencing midnight, 3rd June 2008, the System Operator will change its selection methodology for the procurement of frequency keeping reserve.

The normal half-hourly island based market arrangements will continue to apply, but the Frequency Keeper selection will move from a merit order selection based on price, to a merit order selection based on cost.

The cost of a frequency keeper will be determined from the provider's offer price, and the associated cost of moving the provider to 'centre-of-band' for it to provide the full +/- 50 MW operating range necessary for frequency keeping.

The costs associated with moving the provider to 'centre-of-band' can be considered a component of energy constrained-on costs. The second component of 'constrained-on' cost, associated with the provider's change in power output resulting from its governor control once providing frequency response, will not be considered in the selection methodology. Furthermore, associated constrained-off costs will not be considered under this selection methodology, as historically these costs have constituted only a small component of overall frequency keeping cost.

The reason for the change in selection methodology is to help mitigate the steady cost escalation of frequency keeping costs, particularly in the North Island since December 2007, which has partly been driven by rising constrained-on energy costs associated with frequency keeping.

The following sections explain how the System Operator intends to calculate the cost associated with moving plant to 'centre-of-band' in its selection algorithm. This algorithm is contained in the System Operator's Freqkemy application used for selecting the frequency keeper.

1. Inclusion of constrained on cost calculation

Freqkemy has been designed to operate in two distinct modes:

- Mode One: *selection based on frequency keeper offer only*
- Mode Two: *selection based on frequency keeper offer and associated cost of moving provider to 'centre-of-band'*

As of 00:00 on June 3 2008, Mode Two will be activated on the Freqkemy tool.

2. Formulation of cost of moving provider to centre of band

Freqkemy will calculate the associated cost of moving a provider to 'centre-of-band' using the best information available at time of selection.

As selection must be made at two hours ahead under current market arrangements, the best price indicators at this time are to be found in the SDPQ (Schedule of Dispatch Prices and Quantities).

This is a schedule produced for every trading period on a rolling eight trading period cycle, and forecasts dispatch quantities and prices based on the System Operators load forecast, submitted market offers, and SPD constraints.

Using the SDPQ, the associated cost of moving a provider to 'centre-of-band' will be calculated as follows:

$$QDispMin = Q Min + Q Fko$$

If Po at $QDispMin \leq Pf$, then, $COC = 0$

If Po at $QDispMin > Pf$, then, $COC = (Qcon \times (Po - Pf)/2)$

Where:

QDispMin – Minimum MW dispatch required for frequency keeping

QMin – Control Min

QFko – Frequency keeping offer band

COC – the constrained on cost

Qcon – Dispatched quantity in MWH from that price band in the offer that was constrained on during a trading period.

Po – Price offered for that band by that generator dispatch station block or units for the quantity of electricity from the generating plant which was constrained on.

Pf – Final price prediction for that trading period at the grid injection point/bus, without any FK constraints applied, based on SDPQ.

Problem example:

ABC2201 ABC1 has a Control Min of 100MW. Bus price at ABC2201 was \$20/MW.

ABC2201 ABC1 energy offer tranches are as follows:

Band 1: 50MW at \$0.01,

Band 2: 50MW at \$10.00,

Band 3: 30MW at \$100.00,

Band 4: 40MW at \$150.00

What is the constrained on cost for ABC1 if ABC1 is selected as the only frequency keeper for North Island to provide +/-50MW band?

Solution:

$$Q_{DispMin} = Q_{Min} + Q_{Fko}$$

$$= 100 + 50$$

$$= 150 \text{ MW.}$$

$$P_o \text{ at } Q_{DispMin} = \$150,$$

$$P_f = \$20.$$

Hence,

$$COC = (Q_{con} \times (P_o - P_f) / 2)$$

$$= 30 \times (\$100 - \$20) / 2 + 20 \times (\$150 - \$20) / 2$$

$$= \$2500$$