



Scenario for imbalance cost under stress for P202

Introduction

At the P201/P202 Modification meeting on 14th June 2006, the Proposer of P202 expressed a concern that there were considerable limitations to applying historic analysis to assess a future situation in a winter under stress with P194 applying. It was suggested that scenarios of future stress situations be developed in order to seek to quantify the effects of certain events. The purpose of this note is to quantify such a scenario.

Scenario assumptions

Although the peak settlement period last winter was recorded on 29th November, Period 36 of 29th December probably showed the system under most stress. The events leading up to this were not particularly exceptional and could easily occur in the coming winter. The main elements of a period of stress are:

- High demand (the peak demand on 29th December was 53.8 GW as against the winter peak of 59.5 GW) and
- Unavailability of some generation – this could be due to system constraint, reduction in gas supplies or failure of a large generating unit; lack of wind (or excessively high wind speeds) will be more important each year.

The pricing and balance outcome will be determined by additional factors such as the level of under-forecasting and the timing of information about likely generation shortfall. Equally, these factors will impact on the distribution of shortfalls in settlement. Where there is general under-forecasting until close to real time, then imbalances will tend to be evenly spread among suppliers whereas high demand that is reasonably accurately forecast will tend to see those suppliers with better access to flexible generation (usually through vertical integration) more balanced, with other suppliers bearing the brunt of shortfalls.

Behaviour in the spot markets will also depend on the nature of generation/demand information ahead of time with predicted high demand likely to be accompanied by reasonable liquidity setting the market index price whereas a late upswing in the forecast of demand is likely to be accompanied by liquidity drying up.

In this scenario:

- Demand:
 - The central forecast of demand is above 58 GW for period 36 and there is therefore a reasonable risk of the 59.5 GW peak of 2005 being exceeded;
 - Close to gate closure for the peak period the forecast is confirmed as at the top range of the forecast.
- Generation:
 - Gas supplies are restricted – some CCGT capacity has been withdrawn through late interruption and is not offered into the spot market on alternative fuel because of the risk of start-up failure;
 - Most base load plant is already fully contracted and most mid-merit and other flexible capacity is similarly contracted on a day ahead basis;
 - Closer to real time, any spare flexible capacity is committed to the portfolios that own it and is not therefore available to the spot market or the balancing mechanism;
 - All generation is forecast to balance (simplifying assumption).
- Market Index:

- Only 100 MW of matched trades are made early in the day setting a market price of £350/MWh for period 36 – all other bids withdrawn unmatched¹
- Balancing Mechanism:
 - NIV at 800 MWh made up substantially from BM acceptances rather than BSAD
 - BM Offers the same as for Period 36 on 29th December 2005 (see Table 1) with the exception of:
 - Standing reserve re-priced by an increase of 67% to allow for higher fuel costs relative to when the 2005/6 standing reserve contracts were bid
 - 52 MWh of mixed capacity unavailable due to being held for party balance under the higher demand conditions relative to 29th December 2005
 - Remaining acceptances priced the same as on 29th December 2005.

Table 1: Scenario of BM Acceptance

BMU	Acceptance Volume (MWh)	Standing Reserve	Offer Price (£/MWh)	cumulative volume (MWh)	Cumulative Cost (£)	Cumulative Price (£/MW)
M_SLOY-4	15.00	Y	108.33	15.00	1,625	108.33
T_INDQ-1	67.50	Y	158.33	82.50	12,313	149.24
T_DIDC4G	0.21	Y	286.62	82.71	12,372	149.59
T_DIDC3G	0.21	Y	289.95	82.92	12,433	149.94
E_COWE1	35.00	Y	308.33	117.92	23,224	196.96
T_ABTH9G	8.50	Y	330.00	126.42	26,029	205.90
T_WBUGT-1	0.04	Y	333.60	126.46	26,043	205.94
T_ABTH8G	8.50	Y	336.67	134.96	28,905	214.18
T_LITTD1G	2.04	Y	353.34	137.00	29,626	216.25
T_RUGGT-6	4.54	Y	358.34	141.54	31,254	220.81
T_FERR-5G	8.50	Y	416.67	150.04	34,795	231.90
T_GRAI4G	13.50	Y	416.67	163.54	40,420	247.16
T_FIDL-2G	6.80	Y	416.67	170.34	43,254	253.92
T_FIDL-3G	6.80	Y	416.67	177.14	46,087	260.17
T_GRAI1G	13.50	Y	433.33	190.64	51,937	272.43
E_TAYL3G	30.00	Y	433.33	220.64	64,937	294.31
E_TAYL2G	32.00	Y	450.00	252.64	79,337	314.03
T_FAWL3	176.25		566.28	428.89	179,143	417.69
T_RYHPS-1	17.58		672.00	446.48	190,959	427.70
E_SHOS-1	67.01		672.00	513.48	235,989	459.58
T_PEHE-4G	40.00		1,450.00	553.48	293,989	531.16
T_CNQPS-1	130.00		1,500.00	683.48	488,989	715.44
T_GRAI-4	105.00		1,500.00	788.48	646,489	819.91

- Balance
 - All generators assumed balanced (although a tight situation implies some generation outage, it is assumed – for simplification of calculations – that these will have traded out their positions prior to gate closure.

¹ This is a thinner market than on 29th December 2005 but this is based on a higher level of demand relative to available capacity. Market response to an increased demand forecast is to withdraw capacity already posted.

- Supplier balances as per Table 2:

Table 2: Supplier energy balance position

	Metered demand (MWh)	Contracted (MWh)	Imbalance (MWh)	% shortfall	P201/2 deadband imbalance (MWh)	P201/2 residual imbalance (MWh)
Supplier 1	6,000	5,880	-120	2.00%	-20.0	-100.0
Supplier 2	4,000	3,880	-120	3.00%	-20.0	-100.0
Supplier 3	4,000	3,920	-80	2.00%	-20.0	-60.0
Supplier 4	4,500	4,455	-45	1.00%	-20.0	-25.0
Supplier 5	5,000	4,800	-200	4.00%	-20.0	-180.0
Supplier 6	4,500	4,365	-135	3.00%	-20.0	-115.0
Supplier 7	250	225	-25	10.00%	-20.0	-5.0
Supplier 8	100	88	-12	12.00%	-12.0	0.0
Supplier 9	100	84	-16	16.00%	-16.0	0.0
Supplier 10	50	40	-10	20.00%	-10.0	0.0
Supplier 11	10	5	-5	50.00%	-5.0	0.0
Total	28,510	27,742	-768	2.69%	-183.0	-585.0

- Prices
 - Assumption of no tagging (NIV or otherwise) and no BSAD
 - Resultant prices:

Market Price	£ 350.00 per MWh
Main price (P194)	£ 1,500.00 per MWh
P201/202 tolerance band price	£ 385.00 per MWh
Main price (pre P194)	£ 819.91 per MWh

Assessment of scenario assumptions

This scenario can be characterised as not significantly different from 29th December 2005. The main difference is in using higher demand that removes some of the capacity from the spot market and the balancing market. The other significant difference is the assumed rather than historic imbalance positions, which allows this to be fully public domain and to assess notional but not unrealistic balance positions in terms of impact on portfolios. Although demand is higher, most prices have not been increased (the assumptions on standing reserve prices being an exception although this does not unduly affect results); therefore, balancing mechanism prices have been kept modest despite the change in risk posed by P194 and the higher demand being forecast.

It can therefore be characterised as:

- Tight market with liquidity drying up early in the day as the extent of shortfall leads to available flexible power not being made available in the spot markets (used for internal portfolio balances).
- All suppliers unable, to varying degrees, to balance their portfolios but with smaller suppliers unable at any stage to source the additional power required and therefore facing a worse balance position. It is this primary shortfall that forces the balancing mechanism to resolve market balance at extreme prices. It should be noted that the granularity of the traded market will affect suppliers' ability to balance to varying degrees with Supplier 11 (a composite supplier" based on some of the small suppliers listed in the Appendices of the Ofgem 2004/5 ROC

Report), as a new entrant with a portfolio amounting to less than 100,000 MWh per year, probably only able to get, at best, a base load contract for its average throughput.

- Imbalance resolved through standing reserve and residual un-contracted pumped storage at distress prices.

Results

The resultant cashflow and net cost results are given in Table 3:

Table 3: Cashflow impact of Modifications

	Imbalance cashflow (£)			RCRC cashflow (£)		
	P78	P194	P201/P202	P78	P194	P201/P202
Supplier 1	-£98,390	-£180,000	-£157,700	£66,260	£121,221	£99,750
Supplier 2	-£98,390	-£180,000	-£157,700	£44,174	£80,814	£66,500
Supplier 3	-£65,593	-£120,000	-£97,700	£44,174	£80,814	£66,500
Supplier 4	-£36,896	-£67,500	-£45,200	£49,695	£90,915	£74,812
Supplier 5	-£163,983	-£300,000	-£277,700	£55,217	£101,017	£83,125
Supplier 6	-£110,688	-£202,500	-£180,200	£49,695	£90,915	£74,812
Supplier 7	-£20,498	-£37,500	-£15,200	£2,761	£5,051	£4,156
Supplier 8	-£9,839	-£18,000	-£4,620	£1,104	£2,020	£1,662
Supplier 9	-£13,119	-£24,000	-£6,160	£1,104	£2,020	£1,662
Supplier 10	-£8,199	-£15,000	-£3,850	£552	£1,010	£831
Supplier 11	-£4,100	-£7,500	-£1,925	£110	£202	£166
Total	-£629,694	£1,152,000	-£947,955	£314,847	£576,000	£473,978
	Net cashflow (£)			Net cashflow (£/MWh supplied)		
	P78	P194	P201/P202	P78	P194	P201/P202
Supplier 1	-£32,129	-£58,779	-£57,950	-5.35	-9.80	-9.66
Supplier 2	-£54,216	-£99,186	-£91,200	-13.55	-24.80	-22.80
Supplier 3	-£21,420	-£39,186	-£31,200	-5.35	-9.80	-7.80
Supplier 4	£12,799	£23,415	£29,612	2.84	5.20	6.58
Supplier 5	-£108,766	-£198,983	-£194,575	-21.75	-39.80	-38.92
Supplier 6	-£60,993	-£111,585	-£105,388	-13.55	-24.80	-23.42
Supplier 7	-£17,737	-£32,449	-£11,044	-70.95	-129.80	-44.18
Supplier 8	-£8,735	-£15,980	-£2,958	-87.35	-159.80	-29.58
Supplier 9	-£12,014	-£21,980	-£4,498	-120.14	-219.80	-44.98
Supplier 10	-£7,647	-£13,990	-£3,019	-152.94	-279.80	-60.38
Supplier 11	-£3,989	-£7,298	-£1,759	-398.91	-729.80	-175.88
Total	-£314,847	-£576,000	-£473,978			

In Table 3, the primary price impacts and RCRC flows are analysed. Missing from the picture is the vertical integration effect on RCRC because half the over-recovery will have been spread back to generation with at least 60% of that going back to the vertically integrated suppliers.

What the table shows is how much worse off smaller suppliers are through an inability to balance to within a small percentage of their throughput. P201/P202 significantly mitigates the worst effects of a difficult settlement period for a smaller participant and has a more limited effect on the portfolios of other suppliers but it still leaves a considerable cost indicating the remaining strong incentive to balance. In this scenario, minimising imbalance offered a better financial benefit than trading within any tolerance band.