



National Grid

**National Grid Standing Reserve Market
Report**

**for
Contracts Effective from 1st April 2002 to
1st April 2003**

Prepared by
Operations & Trading

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Executive Summary

This report describes the tender round evaluation process for standing reserve market contracts commencing 1st April 2002.

National Grid evaluated all the tenders received against economic purchase and technical performance criteria in accordance with the agreed terms of the market mechanism. On 17th January 2002, tenderers were notified of the results of their respective tenders. The main points are as follows:

- On 9th November 2001 ('Market Day') a total of 108 discrete tender submissions were received representing 80 sites/units from 27 companies.
- For 2002/03, a total of 2337MW of Standing Reserve service volume was tendered.
- Tenders were received from a variety of service providers including demand, Non-Balancing Mechanism generation and Balancing Mechanism generation participants.
- The tenders were assessed in terms of their economic value whilst taking account of the technical requirements of the system and the other categories of reserve available.
- Of the 108 tenders evaluated, National Grid offered Agreements to 105, 96 of which proceeded to contract.
- The maximum overall volume of successful Standing Reserve is 1822MW comprising:
 - BM Participants 1400MW
 - Non BM Participants 422MW

The next 'Market Day' for receipt of tenders for Agreements commencing on 1st April 2003, is 17:00 hours on Friday 8th November 2002.

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**Prepared by
Operations & Trading
National Grid Company plc
National Grid House
Kirby Corner Road
COVENTRY
CV4 8JY**

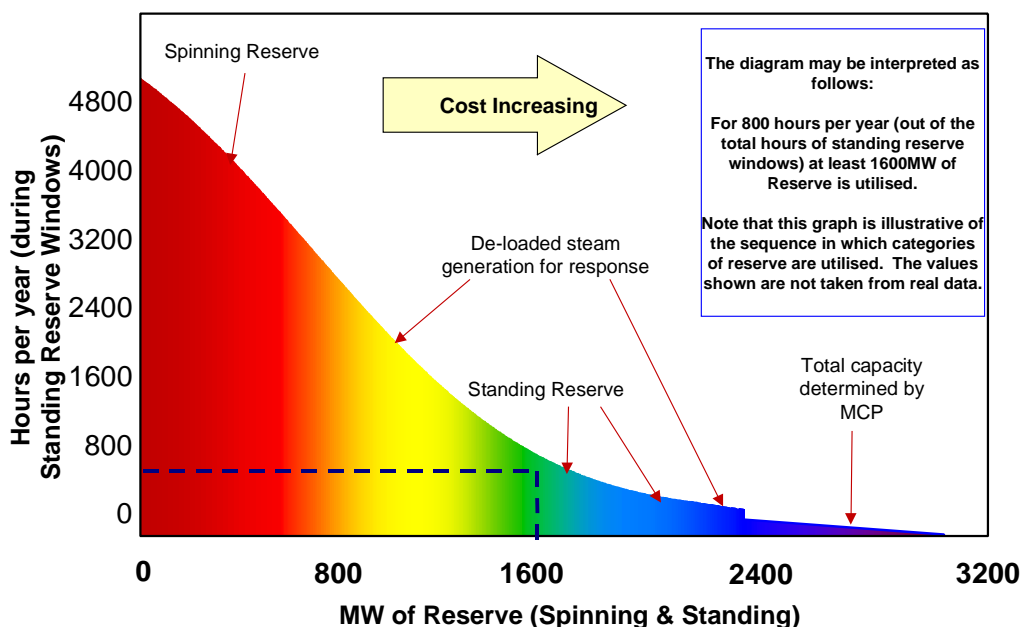
1. Introduction

- 1.1 This report describes the tenders received and the subsequent selection process that led to Standing Reserve contracts being entered into for the period 1st April 2002 to 1st April 2003.
- 1.2 Standing Reserve services for this period are based on the contract form as described in the tender documentation issued on 17th September 2001 and available on the National Grid web site at:
www.nationalgrid.com/uk/indinfo/balancing/mn_standing.html
- 1.3 Since the 1993/94 financial year, National Grid has carried out an annual tender process for the competitive procurement of Standing Reserve services as an economic alternative to reserve delivered from part-loaded generation. National Grid has prepared similar annual reports for each of the Standing Reserve tenders undertaken. These can be found on our website at:
www.nationalgrid.com/uk/indinfo/balancing/mn_archive_tenders.html#standing
- 1.4 Communication of the Standing Reserve tender timescales and the opportunities is made available annually through advertisements placed in the Utility Week publication and via the National Grid website.

2. What is Standing Reserve

- 2.1 At certain times of the day National Grid needs extra power in the form of either generation or demand reduction to be able to deal with actual demand being greater than forecast demand and plant breakdowns. This requirement is met from synchronised and non-synchronised sources (termed Operating Reserve).
- 2.2 Operating Reserve is held for security of supply purposes and comprises options for meeting the last minute changes in demand and available generation during BM timescales. Operating Reserve is provided via two distinct categories:
- Scheduled Reserve
 - Standing Reserve
- 2.3 Figure 1 illustrates the amount of utilisation of any particular element of reserve will depend on whether it is amongst the first or the last to be called. The correct mix of Reserve must be achieved in order to ensure that an optimum cost solution is obtained.

Figure 1
Utilisation of Reserve Energy



- 2.4 The need for Reserve varies across the year, the time of week and time of day, being a function of the system demand profile at that time. To reflect this, National Grid splits the year into five Seasons, for both Working Days (including Saturdays) and Non-Working Days (Sundays and most Bank Holidays), and specifies the periods in each day that Standing Reserve is required. These periods are referred to as Availability Windows.

3. Tender Process

- 3.1 This particular tender round was undertaken to secure a new Standing Reserve service provision for the period 05:00 on 1st April 2002 to 05:00 on 1st April 2003.
- 3.2 The defined Standing Reserve hours are substantially the same as the previous years', having five Seasons with Working Days and Non-working Days separately identified. These hours and service Seasons are shown in Appendix A.
- 3.3 In accordance with the tender rules, tenderers are able to select whether to tender for one or more Seasons (Working Days and/or Non-working Days). Providers who were successful for only some of the seasons tendered were offered a contract for those discrete seasons and day types in which they were successful. However, some providers exercised their right to stipulate in their tender submission that they wish to be selected for all or none of the seasons offered. Where this was the case, the overall annual cost/benefit of a given tender was considered to determine whether or not a contract should be offered.
- 3.4 Service providers also chose whether to tender to provide a 'Committed' or 'Flexible' service. Once a 'Committed' contract is entered into, providers are obliged to make the service available in all contracted service periods. In return, National Grid commits to pay for all the availability offered. With a 'Flexible' agreement, providers are not obliged to make the service available all the time and National Grid is not obliged to accept it (i.e. payment is only made if it is accepted).

4. Tenders Submitted

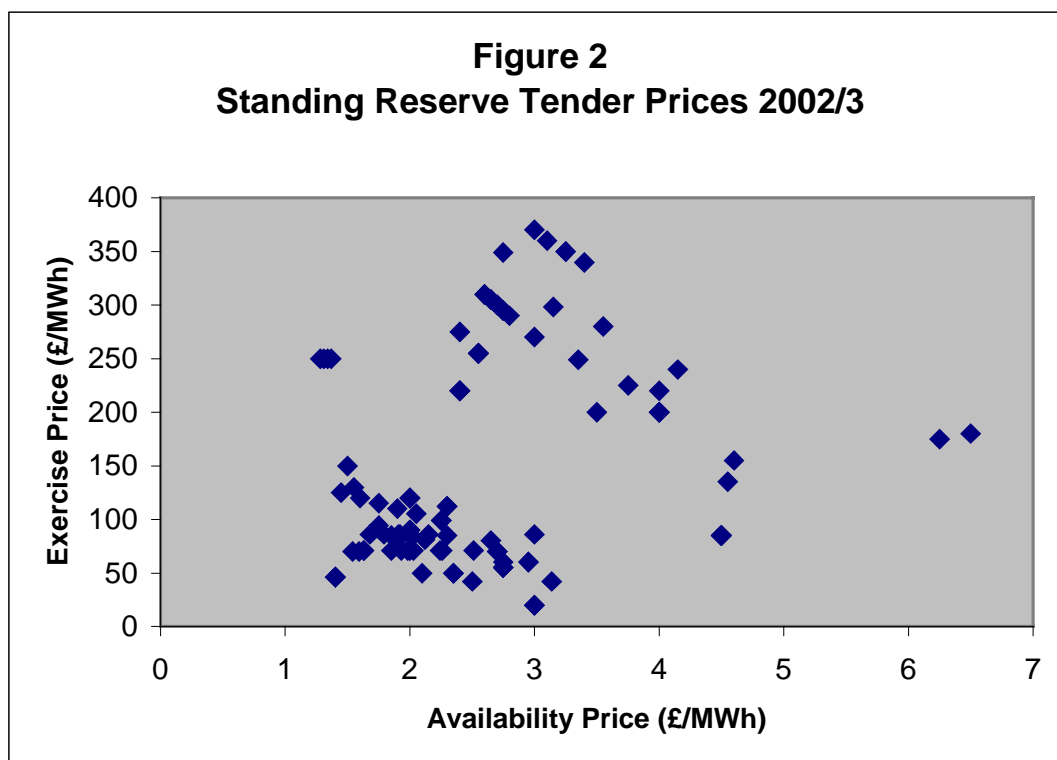
4.1 A total of 108 discrete tender submissions were received, representing 27 companies and 80 different sites. This translates into a maximum volume of 2337MW, of which 464MW was from non-Balancing Mechanism providers.

4.2 The proportion of Committed/Flexible Standing Reserve service options tendered was as follows:

- Committed Only 1989 MW
- Flexible Only 348 MW
- Grand Total 2337 MW

4.3 All tenders were required to comply with certain criteria, and to provide certain information with regard to any service limitations. These parameters are discussed further in Appendix B.

4.4 Pricing for Standing Reserve is made up of an availability payment and utilisation price. A price scatter plot of all tenders received relating to this tender round is shown in Figure 2, below.



5. Tender Assessment

- 5.1 All tenders for each Season (sub-divided into Working Days and Non-Working Days) were evaluated separately. The objective of the economic analysis is to: -
- Identify the minimum cost solution in meeting the reserve requirement using the tenders received and other reserve alternatives for each Season.
 - Re-optimize, if necessary, retaining any plant required to meet the system considerations outlined in Appendix B.
- 5.2 As in previous years, a Mixed Integer Linear Programming model was used to select the economic reserve options for the service. This takes account of: -
- forecast costs of spinning (synchronised) reserve by season;
 - tendered data;
 - the reserve utilisation forecast from statistical analysis (plant failures/shortfalls and errors in demand forecasting);
 - historic and forecast service reliability statistics;
 - any fixed costs associated with service contracts and monitoring systems;
 - the value assigned to the Maximum Contract Price (MCP).
- 5.3 Historic plant losses, generation shortfall statistics and demand forecast errors were analysed to forecast the system requirement for reserve against which tenders were evaluated. Spinning Reserve price forecasts under NETA contribute to the assessment and determine the optimal balance between Spinning and Standing Reserve options.
- 5.4 The tenders were assessed by calculating, first, their effective cost, then comparing this to the Maximum Contract Price (MCP). The value of MCP of £3,000/MWh was selected to be consistent with the value of Value of Loss Load (VLL) which was used to assess Standing Reserve pre-NETA. Previous analysis has indicated that this yields a volume of Standing Reserve consistent with our overall reserve holding requirement.
- 5.5 The effective cost is calculated by ranking the tenders in order of forecast utilisation. The first ranked MW can expect a high utilisation (unless the tender limits utilisation) and so the availability costs are spread over a large energy use and hence the effective cost per MWh is low. The last MW of reserve held will only be utilised infrequently, so the availability costs are concentrated in a smaller energy requirement and the effective cost increases. As utilisation decreases, the overall effective cost eventually crosses and exceeds MCP.

- 5.6 Starting from the expected utilisation of each MW of reserve, an optimisation model was used to find the optimum combination of Spinning Reserve and tendered Standing Reserve to meet the requirement at minimum cost. For the purposes of the optimisation, a “dummy” source of infinite reserve having zero availability fee and a utilisation price of MCP was used, to preclude the selection of tenders which produced an Effective Cost above £3,000/MWh. The Effective Cost of a reserve option is the total anticipated costs incurred (including availability, utilisation payments and any fixed costs), divided by the energy it is expected to deliver. Therefore, it can be seen that the tender assessment is not intended to secure a predefined service volume, but to identify tenders that offer reserve below a predefined price and are economic against other ways of securing reserve.
- 5.7 Figures 3 and 4 illustrate the nature of forecast reserve requirement curves evaluated for Working Days and Non-working Days during each of the Seasons in question. Note that this representation reflects the number of hours in each Service Season. This data is revised annually, although the trends remain similar.

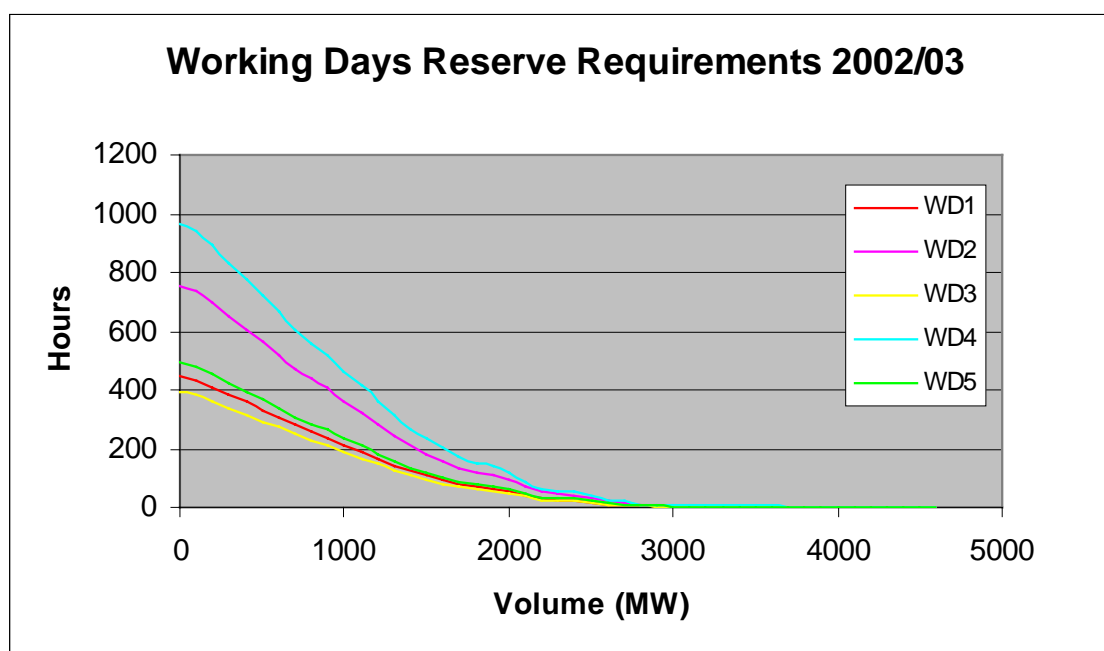


Figure 3

Figure 3 above can be interpreted as follows; the first MW of reserve in Working days Season 4 will be required for 992 hours of the total 1296 hours of Reserve service in WD4, and the 1000th MW of reserve service will be required for some 540 hours of the 1296 total WD4 hours.

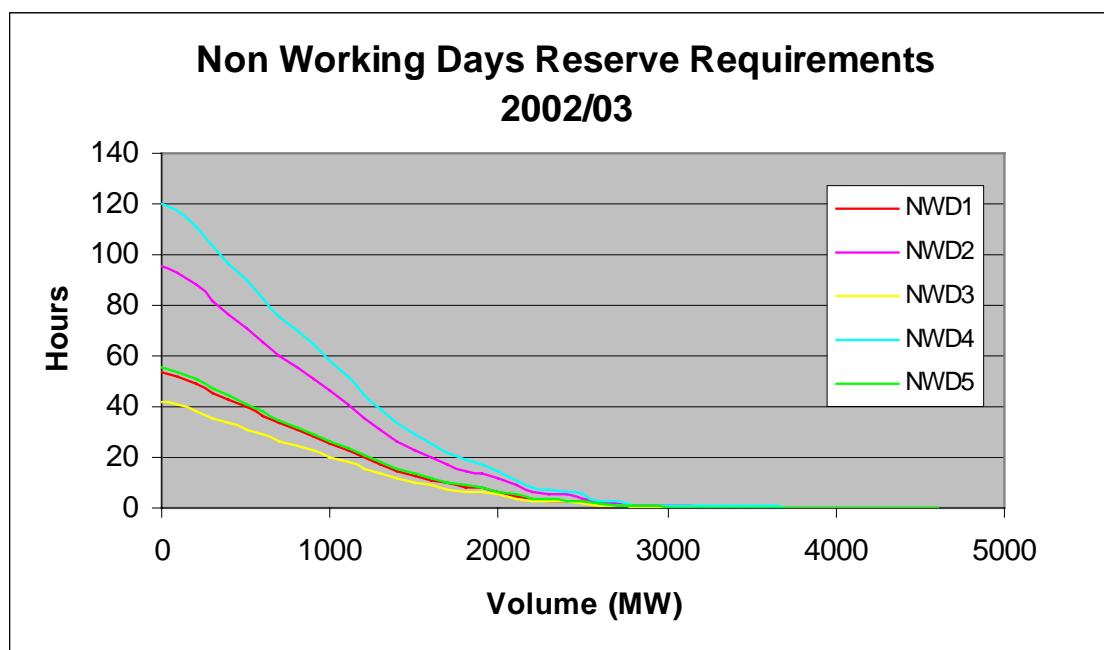


Figure 4

Figure 4 above can be interpreted as follows; the first MW of reserve in Non-Working days Season 4 will be required for 120 hours of the total 161.5 hours of Reserve service during NWD4, and the 1000th MW of reserve service will be required for some 60 hours of the total 161.5 hours.

5.8 Spinning Reserve and Standing Reserve options were evaluated simultaneously using forecast Spinning Reserve price curves, and tendered Standing Reserve prices.

5.9 The above analysis selects a list of tenders on the basis of Effective Cost. The analysis is then repeated against a range of sensitivities shown below. The final tender selection was robust against this range of sensitivities: -

- forecast holding and utilisation prices for spinning reserve;
- levels of plant shortfalls/losses/demand forecast error;
- likelihood of tendered services breaching their utilisation limits;
- possible non-completion of some contracts, particularly with new service providers, or failure of some providers; and,
- variations in the Maximum Contract Price.

6. Assessment Results

6.1 Economic evaluation of the tenders took place through December 2001 and January 2002 and lead to tender success for the following maximum Standing Reserve options in Season 4:-

BM Providers	1400 MW
Non BM Providers	422 MW
Total volume	1822 MW

6.2 The seasonal variation of successful Standing Reserve volumes can be seen in the table below. Since the maximum volume active in any one season is 1822MW, it may be deduced that some services are only tendered (or successful) for part of the year.

Service Season	Successful Volumes (MW)	
	Working Days	Non-working Days
Season 1	1776	1781
Season 2	1769	1774
Season 3	1788	1793
Season 4	1822	1805
Season 5	1820	1803

6.3 Of this successful capacity, all of the services were contracted with in time for Season 1 service commencement.

6.4 Ultimately some tenders failed because either:

- A high utilisation price forced down the expected running to a point where the availability fee increased the effective cost of the reserve above MCP or;
- Because the overall saving in utilisation cost obtained by including a particular tender was outweighed by its availability fee.

7. Comparison with Previous Tender Round

- 7.1 The Standing Reserve tender process has been conducted each year since 1993. One of the major intentions of the tender was to introduce competition from a broad and diverse range of service provisions. The table below shows how the volume of contracted service has changed year on year:

Service Volumes

Financial Year	BM Unit Options (MW)	Non-BM Unit Options (MW)	Total Contracted Volume (MW)
1996/97	1796*	505*	2301
1997/98	1809*	458*	2267
1998/99	1503*	617*	2120
1999/00	1371*	608*	1979
2000/01	1675*	504*	2179
2001/02	1206	417	1623
2002/03	1400	422	1822

Note: * 1996 to 2000 were pre NETA based tender rounds and BM Unit equates with Centrally Despatched terminology (Non-BM equates with non centrally despatched)

- 7.2 Comparing the two NETA based tender rounds held in 2001/02 and 2002/03 then the following two tables show the number of tenders submitted and contracted with a break down of the tendered and contracted volumes.

No. of tenders	Tendered		Contracted	
	2001/02	2002/03	2001/02	2002/03
BM Units	40	51	35	45
Non-BM sites	63	57	61	51
Committed	71	84	66	74
Flexible	32	24	30	22
TOTAL	103	108	96	96

Table showing the number of tenders received and their success for units and sites over the two full years since NETA.

Volume of tenders (MW)	Tendered		Contracted	
	2001/02	2002/03	2001/02	2002/03
BM Units	1649	1873	1206	1400
Non-BM sites	481	464	417	422
Committed	1804	1989	1333	1484
Flexible	326	348	290	338
TOTAL	2130	2337	1623	1822

Table showing the volume of tenders received and their success for units and sites over the two full years since NETA.

APPENDIX A: 2002/03 Service Seasons and Hours

Service Seasons (inclusive)		Service Periods (inclusive)			
		Working Days		Non-Working Days	
1	1 st April 2002 to 3 rd June 2002	I	07:00 – 13:00	I	10:00 – 13:00
		II	16:00 – 21:30	II	19:00 – 22:30
		III	N/A	III	N/A
2	3 rd June 2002 to 2 nd September 2002	I	07:00 - 18:00	I	10:00 – 13:00
		II	20:00 – 22:30	II	18:00 – 23:00
		III	N/A	III	N/A
3	2 nd September 2002 to 28 th October 2002	I	07:00 – 13:30	I	10:00 – 13:00
		II	16:30 – 21:00	II	17:00 – 21:00
		III	N/A	III	N/A
4	28 th October 2002 to 3 rd February 2003	I	07:00 – 14:00	I	10:00 – 13:00
		II	14:00 – 20:00	II	16:30 – 20:00
		III	00:00 – 03:00	III	00:00 – 03:00
5	3 rd February 2003 to 1 st April 2003	I	07:00 – 14:00	I	10:00 – 13:00
		II	16:30 – 20:00	II	17:00 – 20:00
		III	00:00 – 03:00	III	00:00 – 03:00

Appendix B: System Considerations for Selection of Reserve

1. The requirement for Standing Reserve varies throughout the day depending on the generation mix and demand. Changes in generation and demand covered by reserve can occur at any time and therefore reserve margin must be maintained at all times. In meeting this requirement economically, four main aspects must be considered: -
 - (a) Any inherent reserve;
 - (b) Reserve requirements;
 - (c) The cost of reserve options; and,
 - (d) The operating parameters of the reserve plant.

2. Regulating reserve may arise when generators PN positions lead to part loaded generation or other market effects. The despatch of Reserve and/or Balancing Mechanism services takes account of parameters such as:-
 - (a) System requirements;
 - (b) The dynamic parameters;
 - (c) Commercial implications;
 - (d) Minimum operating levels; and
 - (e) Contingency planning.

3. The demand profile and the parameters described above may result in times when the level of reserve required is provided by generation operating part-loaded.

4. There are times when this operating reserve is not sufficient and other reserve options need to be identified. The logic of contracting for only limited hours of each day is borne out by recent utilisation of Standing Reserve. Sensitivity analysis shows that the benefits of extending the service windows would be outweighed by the cost of extra hours of availability payments, even though revisions to the defined service windows are undertaken.

5. The tender submissions included information on a variety of parameters concerning the technical nature of the reserve service offers and other features relevant to the National Grid Company system. These parameters included factors such as the time required in order to initiate the service (Response Time), and the duration for which the service could be sustained (Maximum Utilisation Period).

6. Standing Reserve service definitions stipulate that the maximum Response Time acceptable is 20 minutes. In fact it is desirable for the Grid Operator to have a certain proportion of the Standing Reserve fleet available with a Response Time of 10 minutes or faster. The spread of different capabilities of individual providers normally ensures that this 10 minute requirement is satisfied without using Response Time as a primary selection criteria.

7. Due to the limitations of a finite transmission system, there can exist geographical restrictions on the selection of reserve providers. However, as with the issue of Response Time, the natural variance in the geographical disposition of tendered services means that this does not normally impinge heavily on the selection.
8. The minimum size of a discrete tender is set at 3MW. This is considered an appropriate compromise between a sufficiently low threshold in order to admit as many providers as possible, and the practicality/cost for National Grid to despatch a large number of individual contracts in a short space of time. Given the large number of small non-BM contracts that National Grid has to operate, a PC based monitoring and despatch system Standing Reserve Despatch (SRD) was developed enabling National Grid to more efficiently manage service declarations, call-off the contracts and monitor performance against contract particulars.
9. The anticipated costs incurred by National Grid in the Standing Reserve Despatch (SRD) installation (at new sites - where necessary) and other fixed costs (contract administration) are accounted for on a site (or tender) specific basis as appropriate.