

SHORT TERM OPERATING RESERVE

ANNUAL MARKET REPORT 2014/15

Summary

This Annual Market Report summarises the eighth year (1st April 2014 to 31st March 2015) of the Short Term Operating Reserve (STOR) service. Information on STOR capacity, pricing, availability, and utilisation is presented. The key points:

- Up to 3500MW was contracted consisting of up to 2453MW Committed, 696MW Flexible, and 716MW Premium Flexible. Out of 331 units that tendered 228 units received a contract. Of the units that did get a contract 77 units were Committed-only, 51 Flexible-only, 40 Premium Flexible-only and the remainder received a mixture
- Average contracted prices are £3.87/MW/h Availability and £169.78/MWh Utilisation. Removing for long-term STOR this becomes £2.56/MW/h and £157.69/MWh, this is a reduction from last year of 48% and 14% respectively
- The average availability during the daily peak demand of each day is 2205MW. Total availability payments amount to £40.75m, a 30% reduction on last year
- A total of 233GWh was utilised from STOR units costing £27.95m. This is a 20% and 30% reduction on last year respectively. This is equivalent to £120/MWh.
- Total STOR expenditure in 2014/15 is £68.7m, a 30% reduction compared to 2013/14

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1. Introduction

STOR is a source of extra power either in the form of generation or demand reduction that is non-synchronised and manually instructed. It is used primarily as reserve capacity to support system operation. This report covers the eighth year (Y8) of STOR from 1st April 2014 to 31st March 2015.

Because the requirement for STOR varies by time of year, week, and day, the financial year is divided into six Seasons of varying lengths. The STOR Seasons are often expressed in the form of ‘Year.Season’ for example ‘8.2’ refers to Year 8 Season 2. The times during the day in which STOR is required are known as Windows. There are normally two, up to three, Windows a day. The Window times vary by Season and day type - Working Day (WD) and Non Working Day (NWD). Providers can also make themselves available outside of these Windows referred to as Optional Windows (OW). The Windows for Y8 is given in Appendix A.

STOR is procured through Tender Rounds (TR), typically three a year. The tendered period can be for any Season up to two financial years ahead set at the first TR that year. Each TR is given an independent number designation for example ‘TR25’ is Tender Round 25.

STOR Providers can take the form of a Committed (C), Flexible (F), or Premium Flexible (PF) service. The latter was introduced in Y8. Providers are paid an Availability fee when available within the contracted Window, and a Utilisation fee for energy delivered following an instruction (“Call-off”). These fees are tendered parameters.

For more information on the STOR service please refer to the General Description of the Service document. The link can be found at the end of this report. Any feedback on this report is welcome and should be directed to commercial.operation@nationalgrid.com or through your Account Manager.

2. Tender Information for 2014/15

Figure 1 illustrates the proportion of STOR Providers by size¹ and response time across all Seasons. There are minor differences between the Seasons. Note that size is not specifically assessed during the tender as benefits are compared on a per MW basis, but is a consideration in meeting the volume requirement.

The charts show that around 60% of units are between 3-10MW and 55% can deliver their contracted level within ten minutes of instruction.

Table 1 summarises all the tenders received for Y8 delivery by TR in terms of tendered capability, Availability prices and Utilisation prices. Indexation which is applicable to some prices has not been applied here. Note that contracts agreed during TR10, 11, and 12 were long-term STOR contracts. The opportunity for which was subsequently discontinued hence the gap between TR12 and TR19.

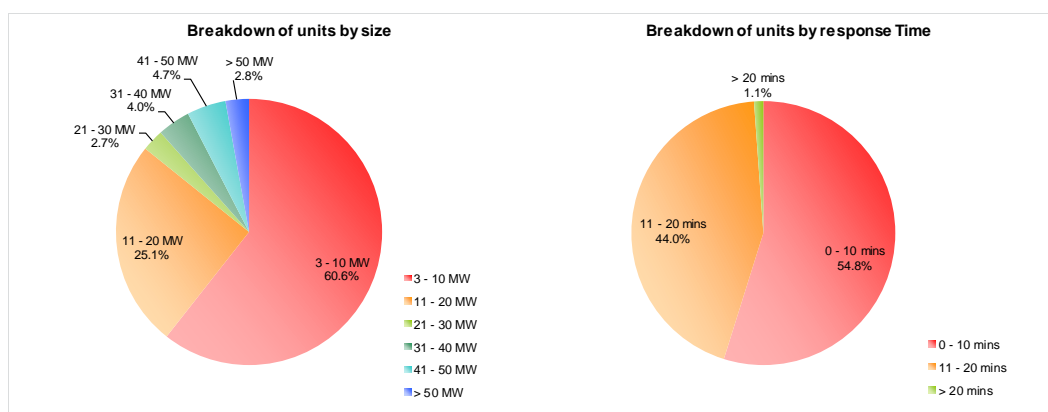


Figure 1: Breakdown of STOR Provider parameters by size and response time

¹ For aggregators using multiple sub sites for the provision of a single contract, the contract is used to denote the unit size

Table 1: STOR Tendered capacity, Availability price, and Utilisation price Y8

Season		8.1			8.2			8.3			8.4			8.5			8.6				
Type of Service		C	F	PF	C	F	PF	C	F	PF	C	F	PF	C	F	PF	C	F	PF		
MW	Tender Round	Accepted	68	-	-	68	-	-	68	-	-	68	-	-	68	-	-	68	-	-	
		Tendered	68	-	-	68	-	-	68	-	-	68	-	-	68	-	-	68	-	-	
	TR10	Accepted	116	-	-	116	-	-	116	-	-	116	-	-	116	-	-	116	-	-	
		Tendered	540	-	-	536	-	-	538	-	-	540	-	-	542	-	-	542	-	-	
	TR11	Accepted	273	-	-	271	-	-	272	-	-	273	-	-	274	-	-	274	-	-	
		Tendered	860	-	-	854	-	-	857	-	-	860	-	-	863	-	-	863	-	-	
	TR12	Accepted	476	-	-	577	-	-	582	-	-	580	-	-	605	14	-	602	14	-	
		Tendered	2,344	134	-	2,545	134	-	2,199	134	-	2,212	134	-	1,962	252	-	2,069	228	-	
	TR19	Accepted	605	136	-	619	138	-	619	116	-	621	116	-	318	122	-	362	118	-	
		Tendered	2,311	176	-	2,348	178	-	2,402	156	-	2,334	156	-	1,706	370	-	2,010	306	-	
	TR20	Accepted	424	-	-	414	8	-	441	-	-	451	-	-	247	91	-	247	91	-	
		Tendered	1,803	20	-	1,744	28	-	1,810	8	-	1,845	8	-	1,027	383	-	1,372	268	-	
	TR21	Accepted	172	260	7	172	258	7	139	79	-	140	79	-	196	141	102	178	141	86	
		Tendered	1,206	364	112	1,198	353	112	1,179	177	118	1,202	177	118	854	182	294	914	186	223	
	TR22	Accepted	-	-	-	-	-	-	202	164	6	204	165	6	47	150	232	47	111	232	
		Tendered	-	-	-	-	-	-	1,016	201	202	1,122	202	202	725	182	497	743	154	492	
	TR23	Accepted	-	-	-	-	-	-	-	-	-	-	-	-	217	178	382	235	178	398	
		Tendered	-	-	-	-	-	-	-	-	-	-	-	-	554	195	382	572	199	398	
	TR24	Accepted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Tendered	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Accepted MW for season		2,134	396	7	2,237	404	7	2,439	359	6	2,453	360	6	2,088	696	716	2,129	653	716	
	Total Accepted MW		2537			2648			2804			2819			3500			3498			
	Availability Price (average £/MWh)*	Tender Round	Accepted	7.00	-	-	7.00	-	-	7.15	-	-	7.15	-	-	7.45	-	-	7.45	-	-
			Tendered	7.00	-	-	7.00	-	-	7.15	-	-	7.15	-	-	7.45	-	-	7.45	-	-
TR10		Accepted	11.00	-	-	11.00	-	-	11.00	-	-	11.00	-	-	11.00	-	-	11.00	-	-	
		Tendered	17.53	-	-	17.49	-	-	17.51	-	-	17.53	-	-	17.55	-	-	17.55	-	-	
TR11		Accepted	11.51	-	-	11.51	-	-	11.51	-	-	11.51	-	-	11.52	-	-	11.52	-	-	
		Tendered	12.03	-	-	12.02	-	-	12.02	-	-	12.03	-	-	12.03	-	-	12.03	-	-	
TR12		Accepted	4.06	-	-	3.99	-	-	3.99	-	-	3.98	-	-	3.98	4.00	-	3.99	4.00	-	
		Tendered	5.12	6.73	-	5.01	6.73	-	5.20	6.73	-	5.21	6.73	-	5.06	6.13	-	5.12	6.11	-	
TR19		Accepted	3.87	3.59	-	3.91	3.58	-	3.91	3.62	-	4.39	3.62	-	5.00	3.74	-	5.07	3.65	-	
		Tendered	4.07	3.52	-	4.08	3.51	-	4.11	3.54	-	4.30	3.54	-	4.48	4.07	-	4.47	3.78	-	
TR20		Accepted	1.83	-	-	1.83	1.50	-	1.84	-	-	1.84	-	-	1.28	0.50	-	1.28	0.50	-	
		Tendered	2.55	2.94	-	2.57	2.58	-	2.60	3.00	-	2.63	3.00	-	2.79	2.79	-	2.67	2.11	-	
TR21		Accepted	0.66	0.41	1.00	0.66	0.41	1.00	0.86	0.72	-	0.86	0.72	-	0.95	0.56	1.67	0.94	0.59	1.63	
		Tendered	2.19	0.81	2.26	2.19	0.80	2.17	2.31	1.34	2.18	2.30	1.29	2.18	7.61	1.06	2.27	2.63	1.10	2.13	
TR22		Accepted	-	-	-	-	-	-	0.46	0.20	0.50	0.46	0.20	0.50	0.61	0.00	0.49	0.61	0.05	0.49	
		Tendered	-	-	-	-	-	-	2.05	0.69	2.26	2.21	0.66	2.26	8.78	0.33	1.38	2.89	0.75	1.38	
TR23		Accepted	-	-	-	-	-	-	-	-	-	-	-	-	1.70	0.02	0.65	1.63	0.01	0.66	
		Tendered	-	-	-	-	-	-	-	-	-	-	-	-	9.87	0.23	0.65	2.48	0.32	0.66	
*Average Accepted Availability Price per Season £/MWh		4.26			4.25			4.04			4.14			3.25			3.27				
Utilisation Price (average £/MWh)*		Tender Round	Accepted	350	-	-	350	-	-	350	-	-	350	-	-	360	-	-	360	-	-
			Tendered	350	-	-	350	-	-	350	-	-	350	-	-	360	-	-	360	-	-
		TR10	Accepted	224	-	-	224	-	-	224	-	-	224	-	-	224	-	-	224	-	-
			Tendered	195	-	-	193	-	-	195	-	-	195	-	-	197	-	-	198	-	-
		TR11	Accepted	206	-	-	206	-	-	206	-	-	206	-	-	206	-	-	206	-	-
	Tendered		217	-	-	217	-	-	217	-	-	217	-	-	217	-	-	217	-	-	
	TR12	Accepted	163	-	-	163	-	-	163	-	-	163	-	-	162	168	-	163	168	-	
		Tendered	187	155	-	186	155	-	189	155	-	189	155	-	194	153	-	192	153	-	
	TR19	Accepted	152	136	-	151	134	-	151	130	-	151	130	-	143	136	-	139	138	-	
		Tendered	192	148	-	191	147	-	191	144	-	193	144	-	202	153	-	197	156	-	
	TR20	Accepted	183	-	-	184	150	-	185	-	-	185	-	-	236	145	-	236	145	-	
		Tendered	190	134	-	192	138	-	190	140	-	189	140	-	215	156	-	213	148	-	
	TR21	Accepted	129	143	80	129	144	80	161	155	-	161	155	-	216	144	141	223	144	147	
		Tendered	186	138	132	186	139	133	191	150	126	191	150	126	222	141	142	217	141	147	
	TR22	Accepted	-	-	-	-	-	-	97	135	80	97	135	80	169	115	90	169	115	90	
		Tendered	-	-	-	-	-	-	183	136	167	180	136	167	209	122	128	207	128	128	
	TR23	Accepted	-	-	-	-	-	-	-	-	-	-	-	-	229	148	142	223	149	146	
		Tendered	-	-	-	-	-	-	-	-	-	-	-	-	228	150	142	226	152	146	
	*Average Accepted Utilisation Price per Season £/MWh		171.07			170.44			167.35			167.28			171.17			171.34			

*Average prices are weighted by MW and hours tendered. Committed(C), Flexible(F), Premium Flexible(PF). PF tenders accepted as F is shown as F, and not included in PF Tendered volume

3. Availability and Utilisation

Figure 2 shows the daily average Window availability and contracted level. The average contracted capacity across the six Seasons was 3040MW, weighted by Season hours, whilst the outturn average daily

availability in Y8 was 2270MW. This is 75% of the average contracted capacity. This difference is due to breakdowns, outages, and flexible operation. Note the large F/PF capacity unavailable during 8.5 – 8.6 as shown later in Figure 10. The total availability payments made in Y8 was £40.75m.

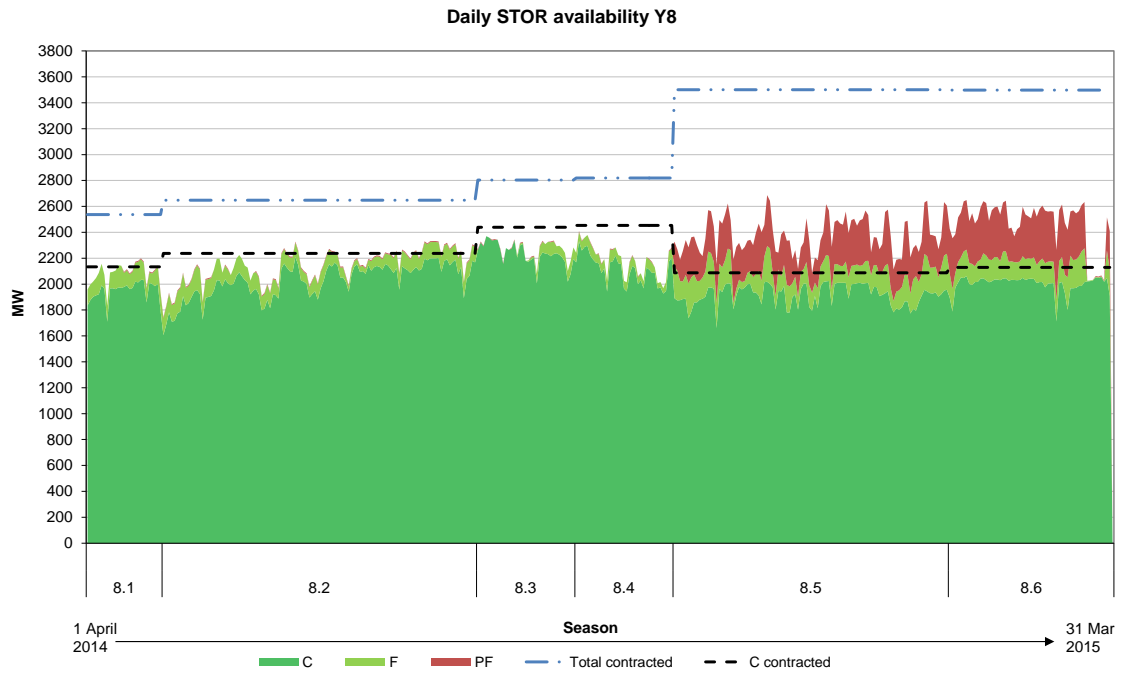


Figure 2: Average daily availability and contracted level Y8

Table 2: Outturn availability, utilisation, and expenditure by Season

		Season					
		8.1	8.2	8.3	8.4	8.5	8.6
No. days on which STOR was utilised:		27	91	32	35	92	57
Average availability out-turn (MW)	C	1,948	2,026	2,236	2,113	1,918	2,003
	F	130	112	61	69	171	157
	PF	7	7	6	6	289	328
Total availability expenditure (£m)	C	2.5	12.7	4.2	3.9	10.6	6.4
	F	0.0	0.1	0.0	0.0	0.0	0.0
	PF	0.0	0.0	0.0	0.0	0.2	0.1
Total utilisation (GWh)	C	14.8	35.2	22.6	28.4	32.2	13.3
	F	1.4	6.2	2.3	4.8	16.9	8.3
	PF	0.0	0.0	0.0	0.0	30.3	16.1
Total utilisation expenditure (£m)	C	1.8	4.2	2.4	3.5	5.0	1.9
	F	0.2	0.8	0.2	0.5	1.7	0.9
	PF	0.0	0.0	0.0	0.0	2.8	2.0

Figure 3 is a stacked timeline chart that shows when STOR was utilised and the daily energy provided. The daily mean utilisation is 638MWh. The total energy provided in Y8 inclusive of OW is 233GWh at a cost of £27.95m. This is equivalent to £120/MWh. The average, non-long-term STOR, contracted Utilisation price is £157.69/MWh.

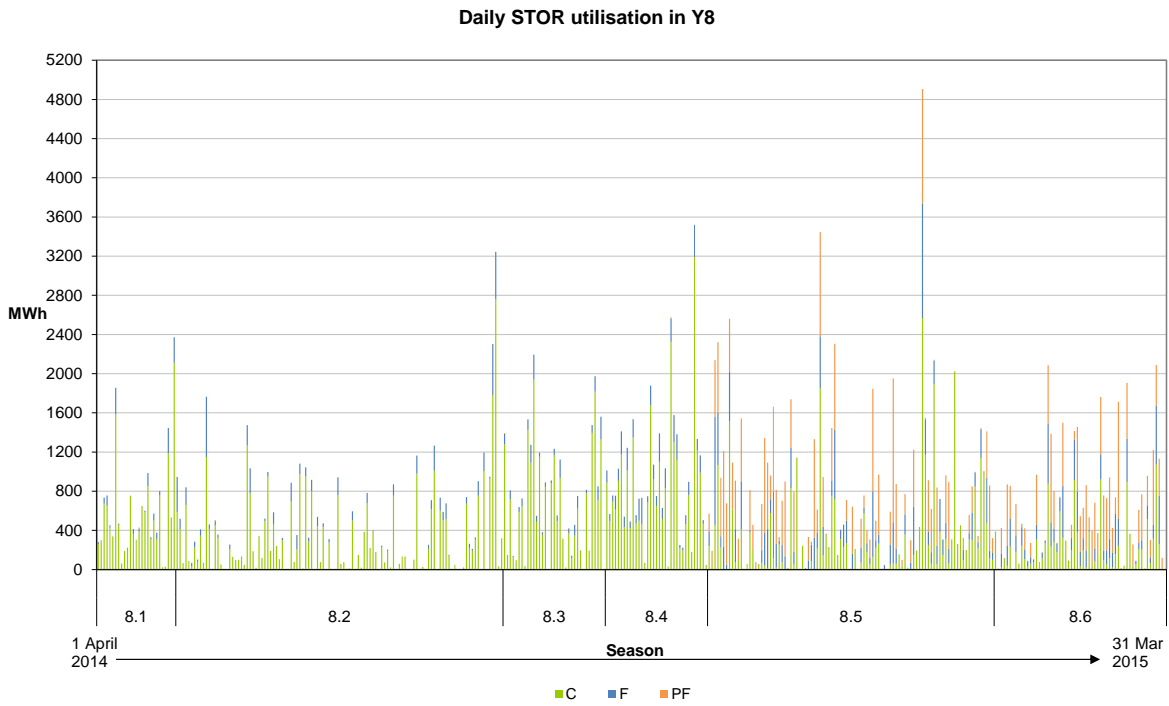
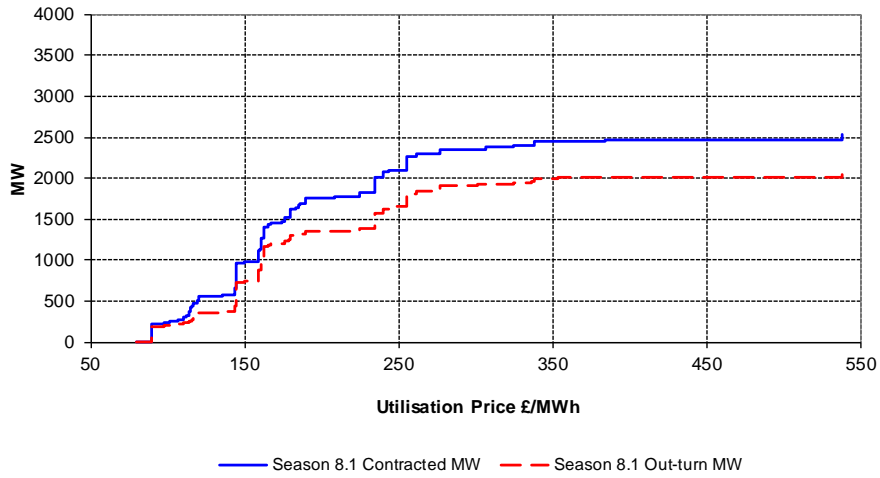


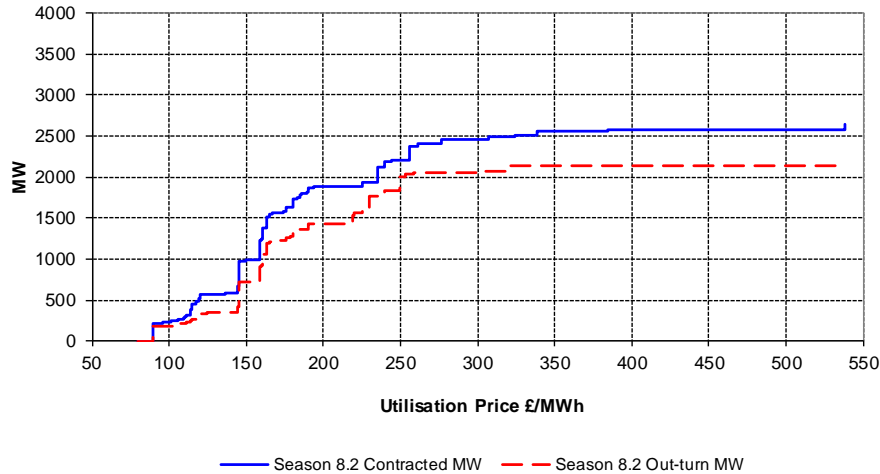
Figure 3: Daily STOR utilisation in Y8

Figure 4 shows the Utilisation price stack as contracted (blue line) and outturn (dashed red line) for each Season in Y8. The chart was created by sorting the units in ascending order according to its Utilisation price. The Utilisation prices include indexation where it applies.

Cumulative Capacity by Utilisation Price for Season 8.1



Cumulative Capacity by Utilisation Price for Season 8.2



Cumulative Capacity by Utilisation Price for Season 8.3

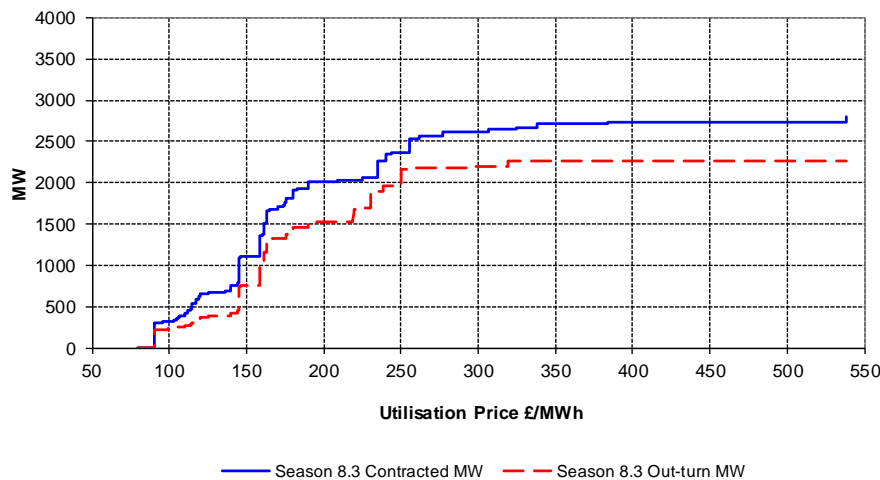
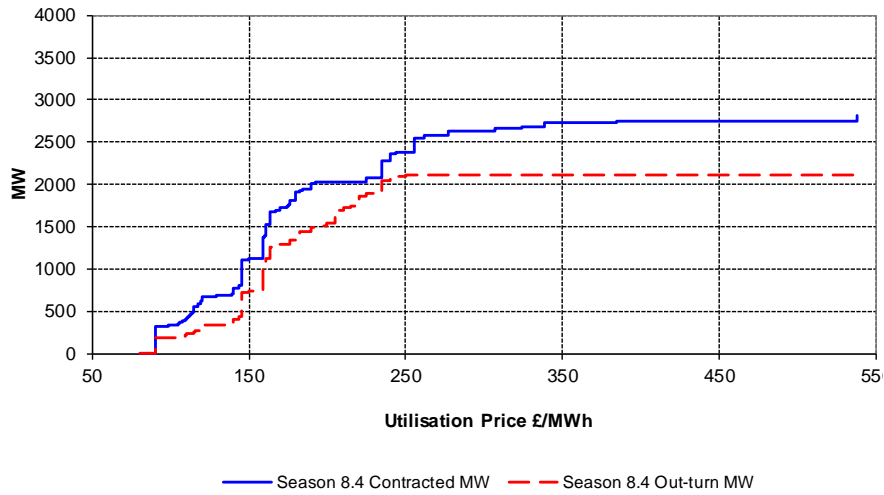
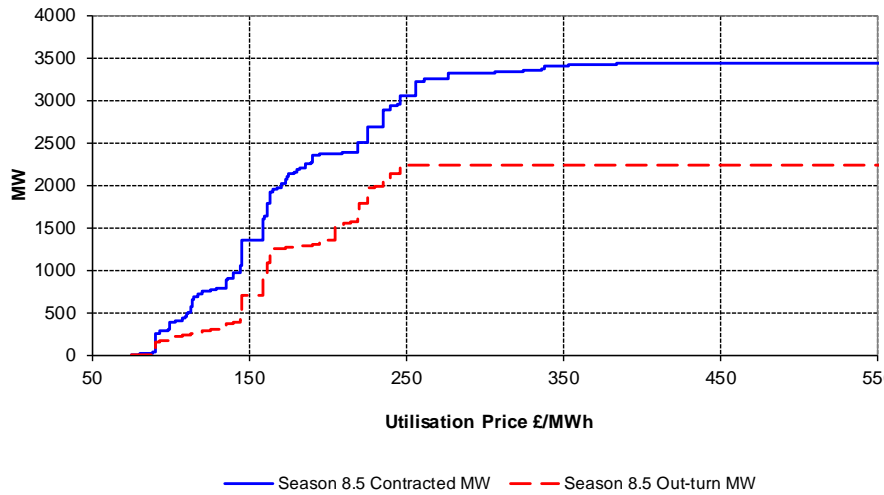


Figure 4a: Contract and outturn stack based on Utilisation price

Cumulative Capacity by Utilisation Price for Season 8.4



Cumulative Capacity by Utilisation Price for Season 8.5



Cumulative Capacity by Utilisation Price for Season 8.6

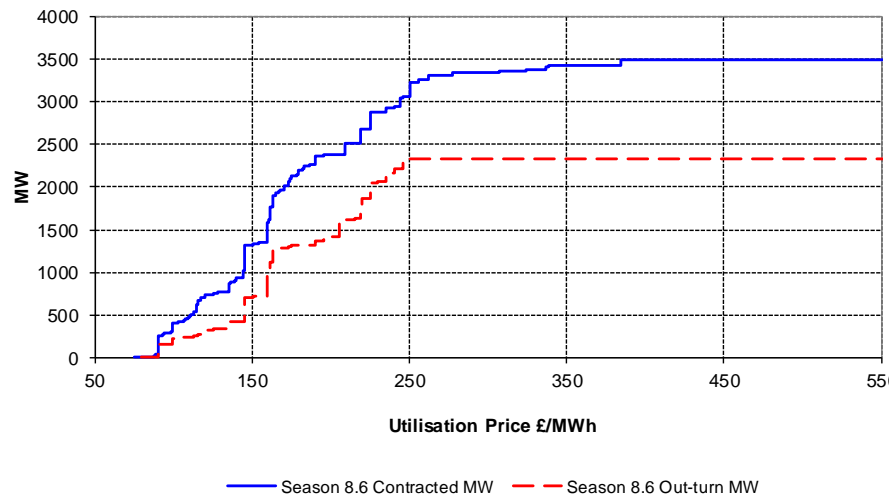


Figure 4b: Contract and outturn stack based on Utilisation price

4. Utilisation by Season and Price

Figure 5 plots utilisation volume per Season hour, excluding OW, to allow direct comparison between Seasons of varying lengths. Figure 6 shows the total STOR utilisation by price bins and Window type. The number of units contracted and the capacity by Utilisation price is given in Table 3

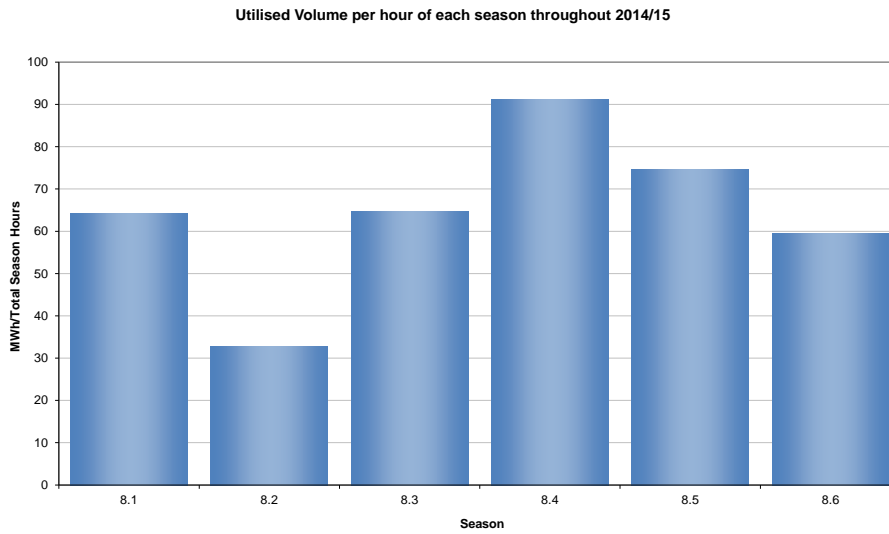


Figure 5: Total STOR utilisation per Season hour

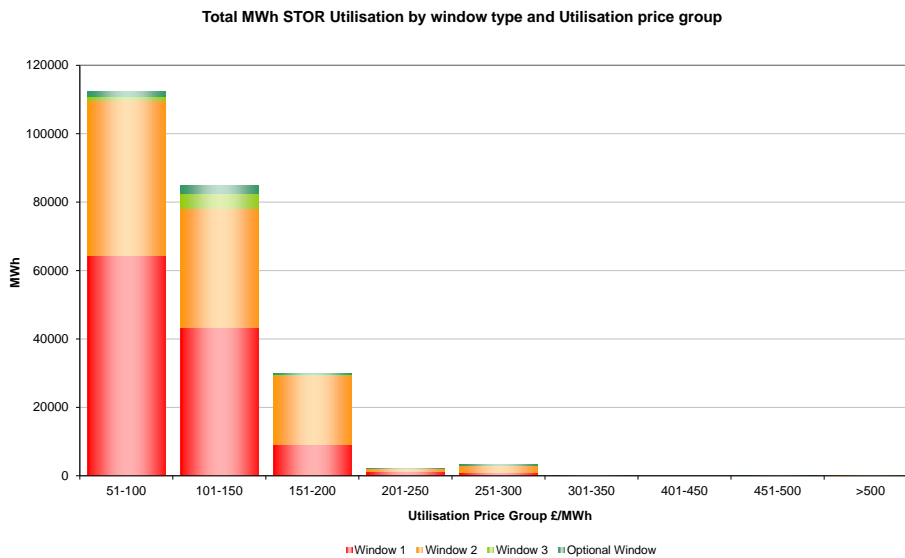


Figure 6: Total STOR utilisation by Utilisation Price

Table 3: Contracted number of units and capacity by Utilisation price bins

Utilisation price group £/MWh	Season											
	8.1		8.2		8.3		8.4		8.5		8.6	
	Units	MW	Units	MW	Units	MW	Units	MW	Units	MW	Units	MW
51 - 100	8	241	9	247	11	328	11	332	23	387	24	401
101 - 150	61	736	60	740	64	781	65	792	71	969	68	938
151 - 200	38	789	38	892	41	905	40	900	61	1019	63	1035
201 - 250	17	334	17	334	18	354	18	358	24	687	24	686
251 - 300	16	254	16	254	16	254	16	254	16	254	16	254
301 - 350	8	91	8	89	8	90	8	91	8	92	8	92
351 - 400	2	24	2	24	2	24	2	24	2	24	2	24
451 - 500	0	0	0	0	0	0	0	0	0	0	0	0
>500	4	68	4	68	4	68	4	68	4	68	4	68

5. Utilisation by Location

There are occasions in which particular STOR units are utilised with consideration of its geographic location along with its submitted prices, for example when there are transmission constraints. Figure 7 shows utilisation, including OW and irrespective of reason, by unit location. Note that Multiple refers to aggregated units containing sub-units from various geographic locations.

Table 4 gives additional information by the locations including the number of units, capacity, and hours utilised.

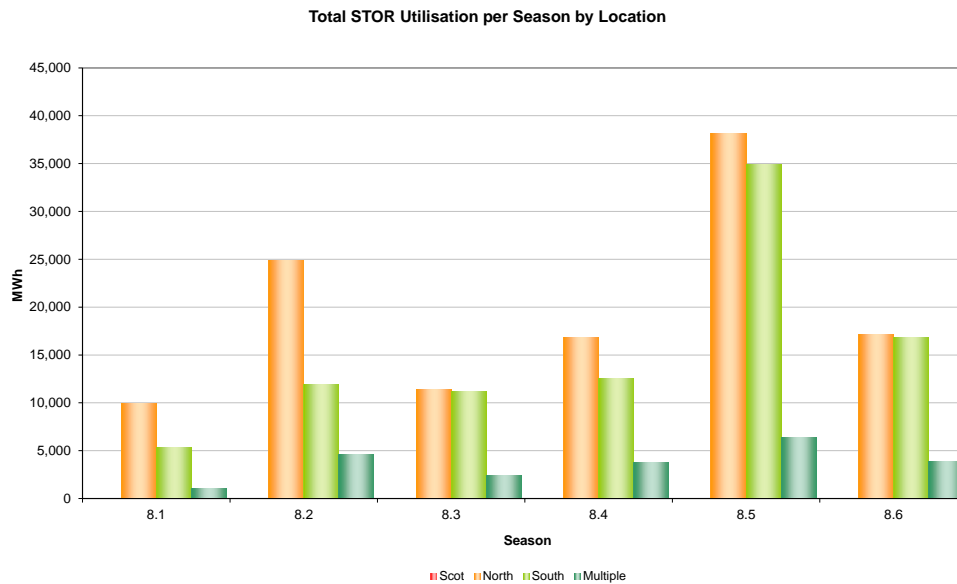


Figure 7: Total STOR energy utilisation per season by location

Table 4: Number of units, capacity, hours and energy utilised by location

Unit Location	Season											
	8.1				8.2				8.3			
	No. of units	Total MW	Total Util. Hours	Total Util. MWh	No. of units	Total MW	Total Util. Hours	Total Util. MWh	No. of units	Total MW	Total Util. Hours	Total Util. MWh
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
North	52	1,194	255	9,941	54	1,251	885	24,863	57	1,265	344	11,345
South	59	1,040	303	5,297	58	1,098	961	11,873	68	1,242	568	11,201
Multiple	43	303	184	1,046	42	299	802	4,597	39	297	389	2,444

Unit Location	Season											
	8.4				8.5				8.6			
	No. of units	Total MW	Total Util. Hours	Total Util. MWh	No. of units	Total MW	Total Util. Hours	Total Util. MWh	No. of units	Total MW	Total Util. Hours	Total Util. MWh
Scotland	-	-	-	-	3	33	-	-	3	33	-	-
North	57	1,271	481	16,789	60	1,375	1,014	38,105	60	1,377	556	17,127
South	68	1,251	690	12,574	70	1,520	1,440	34,951	71	1,522	867	16,796
Multiple	39	297	638	3,809	76	572	1,103	6,355	75	566	586	3,836

6. Utilisation by Day Type

Figure 8 depicts the total STOR utilisation, including OW, for each day of the week. Note that Seasons are of differing lengths reflected in the magnitudes of the curves. The Season lengths are given in Appendix A.

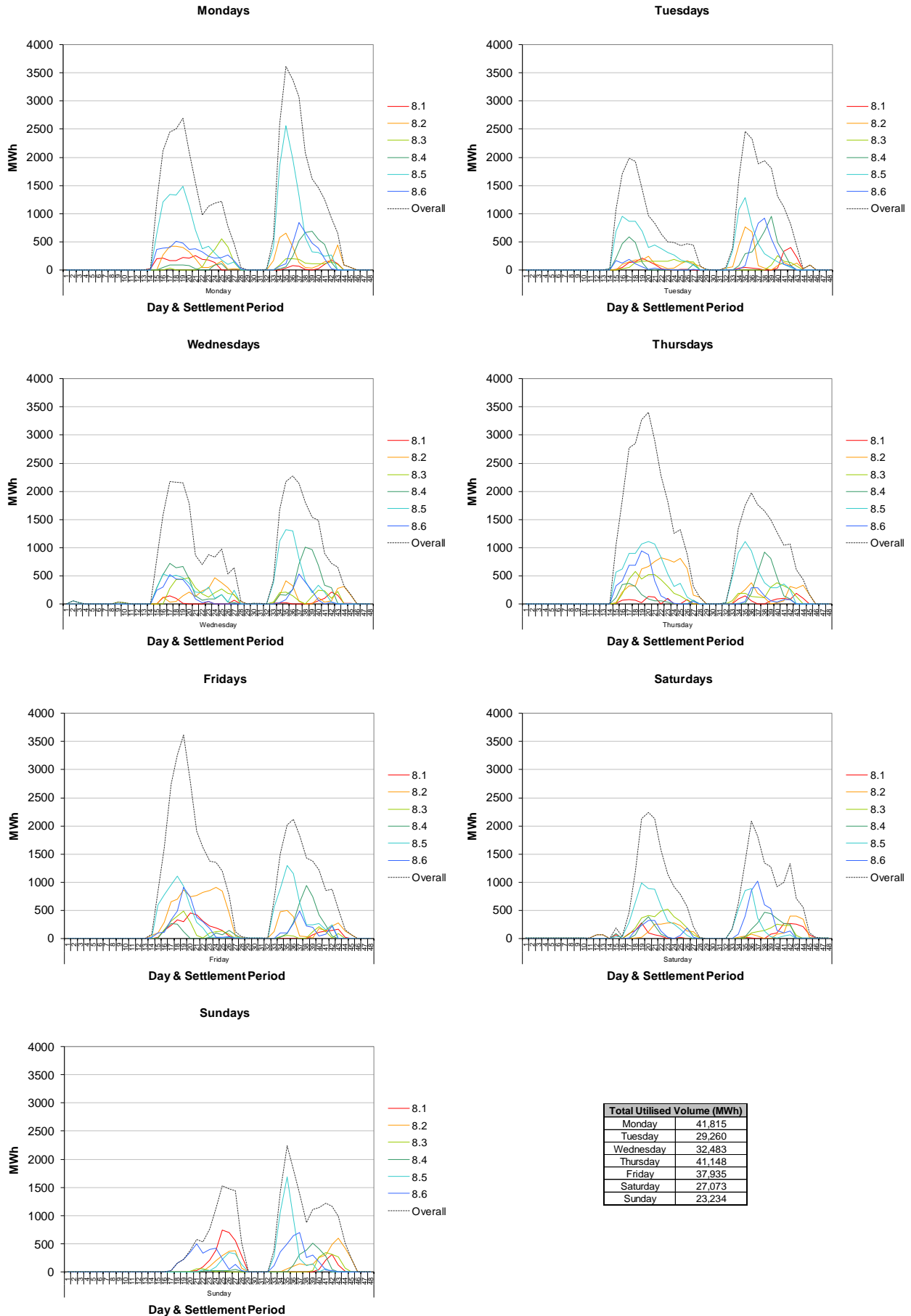


Figure 8: Total utilised energy for each day of the week

7. Frequency of Call-offs

The duration profile of Call-offs is given in Figure 9. It shows that around 90% of instructions last for at least thirty minutes. The average call-off duration is approximately 100 minutes.

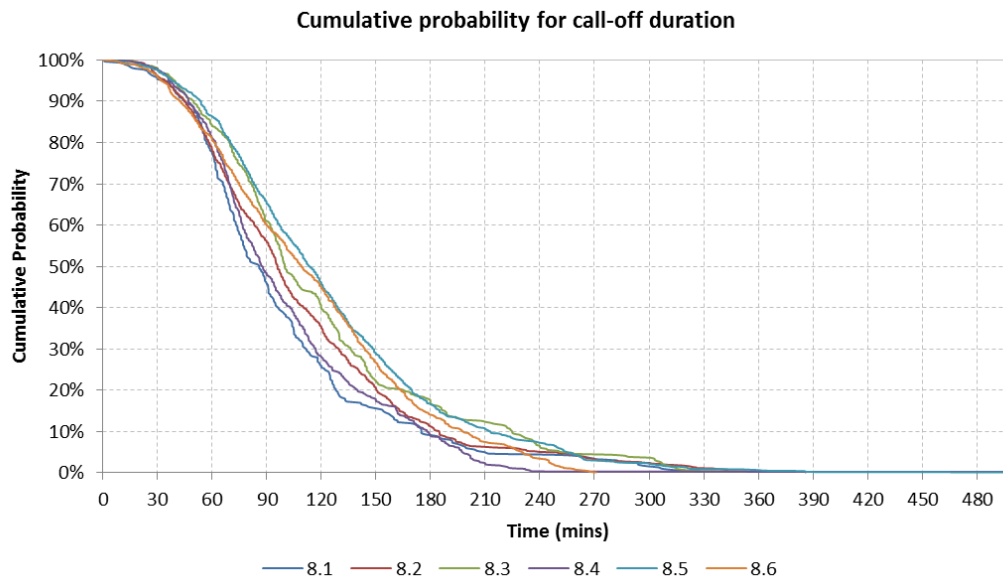


Figure 9: Duration curves showing the percentage of Call-offs and length of utilisation

8. Flexible STOR Assessments

The Flexible STOR service is assessed weekly following Provider submissions of week-ahead availability. Figure 10 shows the amount of capacity accepted, rejected, and unavailable for each week. Note that this is the week-ahead availability and actual availability may differ.

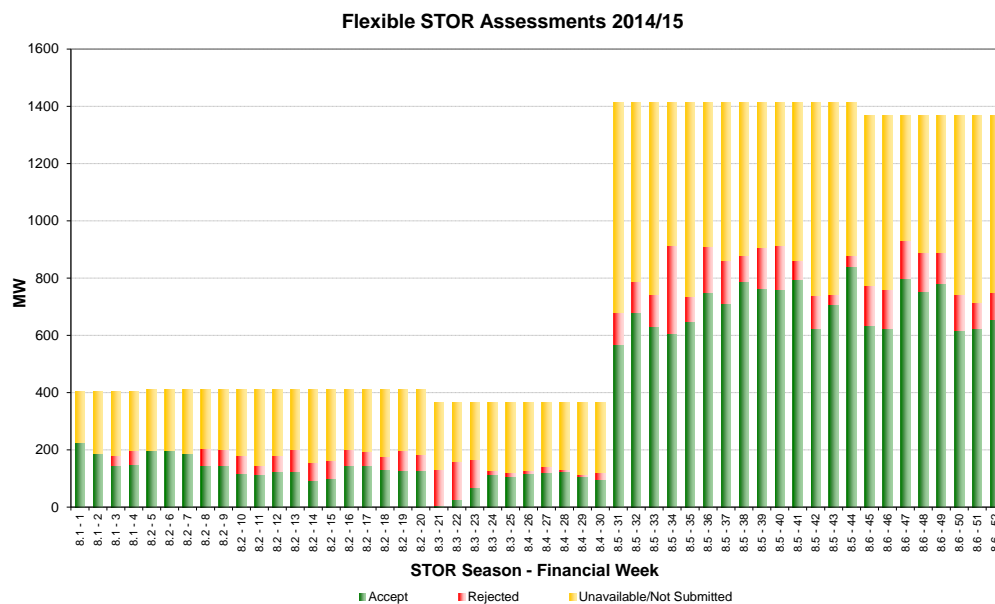


Figure 10: Flexible STOR assessments at week-ahead

9. Further Information

STOR: General Description of the Service <http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=29274>

Tender Assessment Principles	http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=29290
Procurement Guidelines Report	14/15: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=40784
	13/14: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=32997
	12/13: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=14732
Previous STOR Annual Market Reports	Y7: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=40521
	Y6: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=31977
	Y5: http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=11749
	Y4: http://www.nationalgrid.com/NR/ronlyres/AD980857-E490-4943-81D5-D08A84B6776B/50871/STOR_End_of_Year_Report_2010_11.pdf
	Y3: http://www.nationalgrid.com/NR/ronlyres/41B8C2BF-4A3B-471B-9FF8-6EBE9C51C9BF/44264/STOR_End_of_Year_Report2009_10.pdf
	Y2: http://www.nationalgrid.com/NR/ronlyres/DC24F8EF-FFC4-4681-B3F5-55B4E91ED61C/37024/STOREndofYearReport0809.pdf
Y1: http://www.nationalgrid.com/NR/ronlyres/209E0BFA-17EB-4140-9CCF-3C92BE803191/27564/STOREndofYearReport0708_Final.pdf	

Appendix A

STOR windows for Year 8 (2014/15)

Seasons 2014/15								
Season	Dates	WD		NWD		Hours/Day Type		Total
		Start Time	End Time	Start Time	End Time	WD	NWD	
1	05:00 on Tuesday 1st Apr 2014 - 05:00 on Monday 28th Apr 2014	07:00	13:30	10:00	14:00	209	32.5	241.5
		19:00	22:00	19:30	22:00			
2	05:00 on Monday 28th Apr 2014 - 05:00 on Monday 18th Aug 2014	07:30	14:00	09:30	13:30	1081	126	1207
		16:00	18:00	19:30	22:30			
3	05:00 on Monday 18th Aug 2014 - 05:00 on Monday 22nd Sep 2014	07:30	14:00	10:30	13:30	348	36	384
		16:00	21:30	19:00	22:00			
4	05:00 on Monday 22nd Sep 2014 - 05:00 on Monday 27th Oct 2014	07:00	13:30	10:30	13:30	330	32.5	362.5
		16:30	21:00	17:30	21:00			
5	05:00 on Monday 27th Oct 2014 - 05:00 on Monday 2nd Feb 2015	07:00	13:30	10:30	13:30	931.5	127.5	1059
		16:00	21:00	16:00	20:30			
6	05:00 on Monday 2nd Feb 2015 - 05:00 on Wednesday 1st Apr 2015	07:00	13:30	10:30	13:30	550	60	610
		16:30	21:00	16:30	21:00			
						3449.5	414.5	3864

Season	WD	NWD
1	22	5
2	94	18
3	29	6
4	30	5
5	81	17
6	50	8

Total Hours	3864
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