STOR Market Information Report TR31

Originally Published 24th March 2017.

Foreword

Welcome to the TR31 Market Information Report, and the first tender opportunity for STOR Year 12. We continue to show tendered MW for each bid which we hope provides a greater degree of understanding of the STOR market.

We published an Outline Change Proposal (OCP) at the end September and welcomed feedback from participants. Thank you to those who responded with their comments. We decided to implement some proposals, including, sharing of operational data with relevant DNO's, requirement to provide MPAN information and lifting restrictions on the number of OCP publications in a year. These changes have been reflected in revised STOR Standard Contract Terms effective from 1st April 2017.

In general, we had a mild, windy winter with high plant availability but this was not without a variety of challenges. We issued 2 Capacity Market Notices (CMN) on 31st October and 7th November due to tight margins. We saw market participants respond and both notices were subsequently cancelled. In addition, there was a reduction in IFA capacity to 1GW, but through the use of STOR and other tools at our disposal, we were able to manage this.

We continually monitor availability from Flexible and Premium Flexible units and as we have seen over the past few seasons, there is a reduced availability from these units which in turn, lowers our forecast going forward. As a result we are looking to procure a large proportion of our requirement through committed tenders where economic to do so, while refining the remaining volume through Flexible tenders.

We are keen to hear your thoughts on how we can improve the STOR service or this report, so if you do have any comments, please do get in touch.

Thanks,

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Introduction

This market report is produced after each tender round and is designed to give existing and potential STOR participants an overall view of the tenders received in tender round 31 (TR31). The report provides details of tendered utilisation and availability prices and National Grid's consequent forward contracted position; together with further details on the type and dynamics of the tendered plant. For further information regarding this product, Frequently Asked Questions, or how and when to tender please consult the STOR section found on the National Grid Balancing Services information website:

http://www2.nationalgrid.com/uk/services/balancing-services/reserve-services/short-term-operating-reserve/

This report is under continuous review and development, if you have any comments or suggestions of information you would like to see in future issues of this report, please contact your account manager.

Data and charts that were previously found in this report can still be found in the associated Excel file available on the website.

Operating Reserve Requirement and STOR requirement and de-rating factors

As National Electricity Transmission System Operator (NETSO), National Grid holds an Operating Reserve Requirement (ORR) from 4 hours ahead of time to real time, to take account of demand forecast errors, plant losses and market imbalance. The ORR is met by headroom on market synchronised machines, additional actions taken by National Grid via the Balancing Mechanism (BM) and contracted reserve products. STOR is a contracted reserve product and as such STOR tenders can make up a finite proportion of the ORR. The amount of contracted STOR required is determined by the size of the ORR which changes due to forecast market length, market provided headroom, volume of intermittent generation and demand forecast errors. The proportion of the ORR met by STOR is determined by considering the technical system requirements and also the forecast cost of alternatives versus the cost of the tendered STOR units.

National Grid aims to procure STOR tenders such that a minimum of 1800MW of contracted STOR is made available throughout the STOR seasons. The daily and seasonal optimal STOR MW level varies due to real-time and seasonal pressures on the system, but National Grid typically aims to achieve approximately 2300MW of STOR available where economic to do so.

National Grid manages the optimal STOR MW level at a daily resolution through the week-ahead Flexible STOR assessment, refining the available portfolio in response to the forecast conditions for the week-ahead.

In order to achieve the optimal level at the week-ahead stage, National Grid examines historic availability profiles from Committed and Flexible providers to help determine the volume of STOR tenders to procure at the tri-annual tender round. During the assessment National Grid uses specific unit forecasts based on history where available and also based on any other information available, however as a general rule the following de-rated percentages can be applied to the data to develop a clearer understanding of the actual volume available. BM-C 90%, NBM-C 85%, NBM-F non winter 50% NBM-F winter 25%. These figures represent average outturn availability over the various seasons, the actual availability over the peak winter evenings has been as low as zero. When considering the capacity accepted and tendered it is important to think of it not in absolute volumes but instead the de-rated volume. Whilst there is currently no fixed limit to the amount of Committed, Flexible, or Premium Flexible we are willing to accept, committed units are key in meeting the requirement during those periods of low non-committed availability and as such National Grid values committed units particularly in the winter seasons.

The two versions of the chart below demonstrate this concept and also highlight the recent change in the market “available capacity” over the winter months in particular.

Figure 1 gives a breakdown of the accepted Flexible and Committed MW per season since the start of the STOR service. Premium Flexible tenders are included in the Flexible category for the purpose of this chart. The blue line represents the sum of the maximum tendered MW from unique units from any tender round for each season. Capacity is as tendered, in a change to previous charts unsuccessful tenders from 2010 long term tenders have been removed from the maximum MW tendered. For seasons with tender rounds still to come, this figure will increase if units that thus far have not tendered for that season, tender in. The black line on the chart represents the outturn average availability for each season (where available).

Figure 2 gives exactly the same data as figure 1 but using the general de-rating figures shown above. This demonstrates a much closer match between total de-rated MW and the actual outturn available MW. It also demonstrates how the excess capacity has decreased from ~2000MW in year 7 and 8 to ~1300MW for winter year 10.

It should also be noted that the Maximum tendered capacity is greater than (or equal to) the actual current capacity as some units have left the market or reduced their capacity.

Figure 1

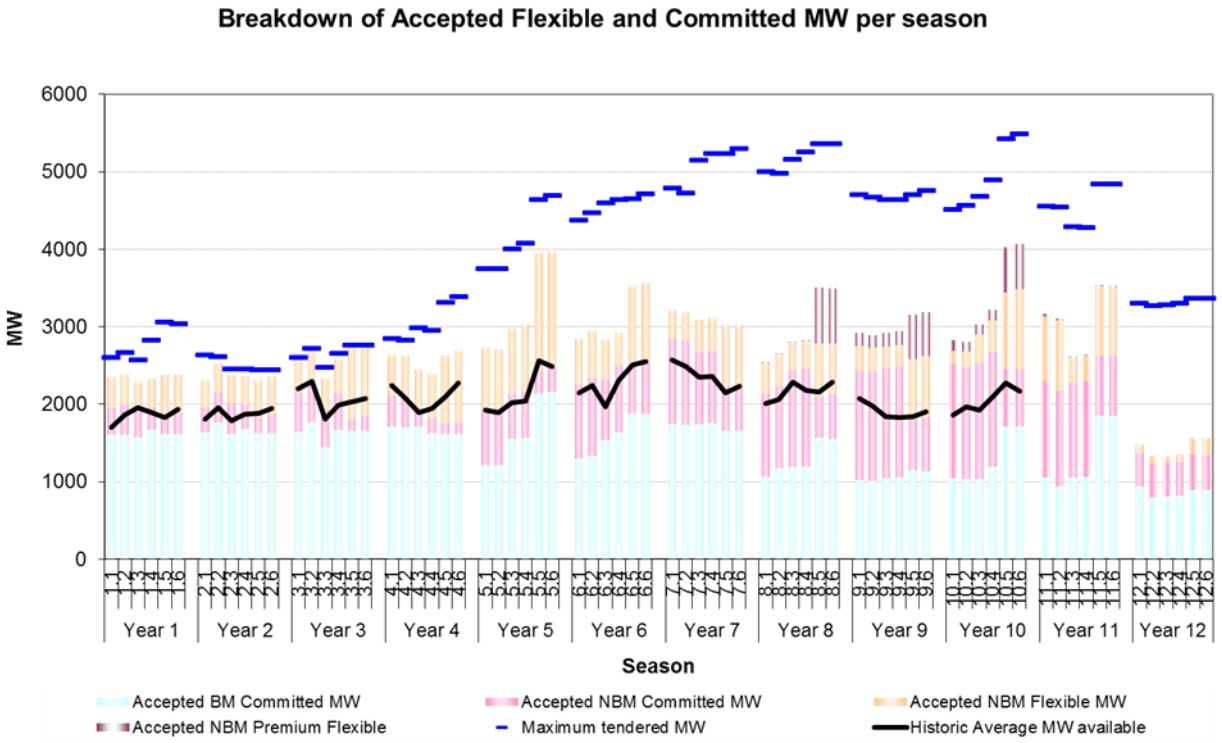
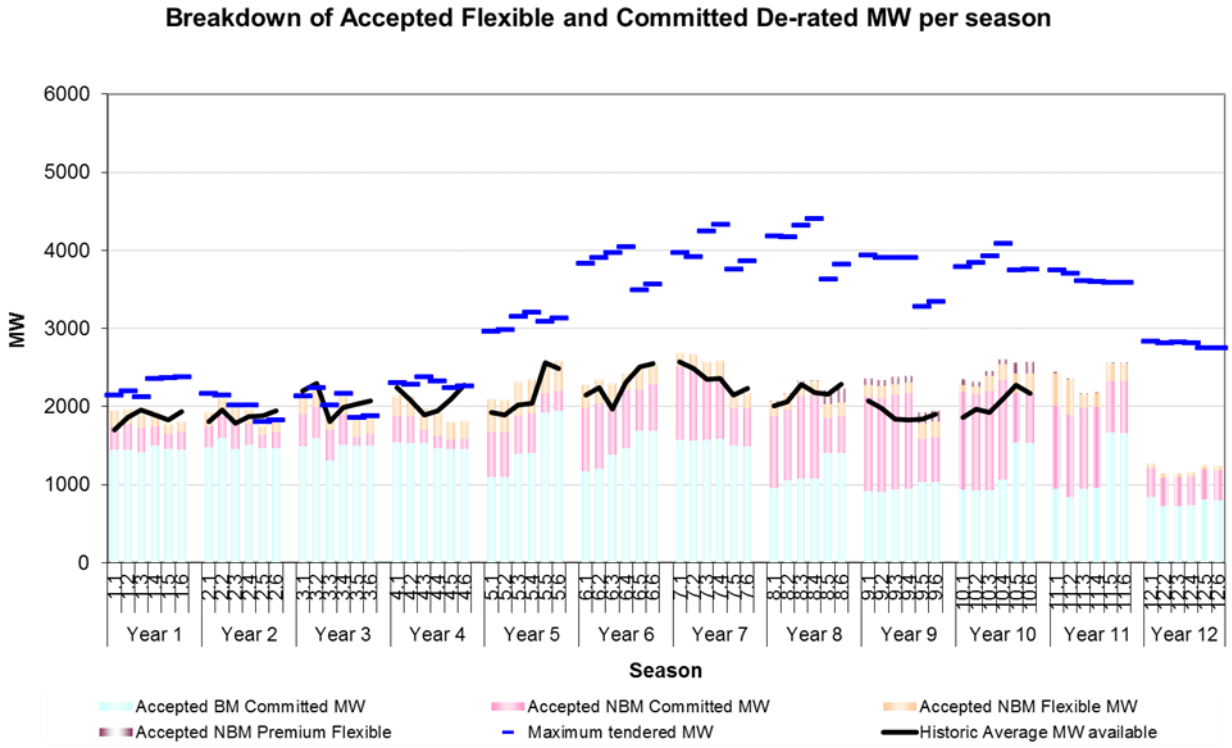


Figure 2



Tenders received and assessment results

Table 1 below summarises the tenders received including STOR Runway it also summarises the total contracted and de-rated. A full breakdown of contracted and tendered data can be found in the Excel file.

	TR 31 Tenders						STOR Runway TR31 tenders					Already contracted capacity	
Season Number	BM-C	NBM-C	NBM-F	NBM-PF	Total	De-rated Total	RW-C	RW-F	RW-PF	Total	De-rated Total	Total	De-rated Total
11.1	603	176	591	60	1430	1018	8	0	0	8	7	2459	2066
11.2	601	175	665	60	1501	1052	27	5	0	32	25	2326	1948
11.3	601	320	73	29	1023	864	44	10	4	58	44	2435	2047
11.4	571	262	73	38	944	792	55	10	5	70	54	2451	2060
11.5	1295	50	30	0	1375	1216	60	15	11	86	58	2739	1882
11.6	1295	56	30	0	1381	1221	60	15	12	87	58	2733	1877
12.1	1803	789	0	185	2777	2386	60	15	12	87	65	389	331
12.2	1665	790	0	171	2626	2256	60	15	12	87	65	387	329
12.3	1672	790	0	171	2633	2262	60	15	12	87	65	388	330
12.4	1683	709	0	265	2657	2250	60	15	12	87	65	389	331
12.5	1932	411	362	0	2705	2179	60	15	12	87	58	390	332
12.6	1926	417	362	0	2705	2178	60	15	12	87	58	390	332

Table 2 below summarises the accepted units and the approximate requirement remaining for the next tender rounds.

	TR 31 Tenders Accepted						STOR Runway TR31 tenders Accepted					Remaining
Season Number	BM-C	NBM-C	NBM-F	NBM-PF	Total	De-rated Total	RW-C	RW-F	RW-PF	Total	De-rated Total	Total
11.1	0	34	624	4	662	343	5	0	0	5	4	-
11.2	0	34	706	4	744	384	10	4	0	14	11	-
11.3	0	37	89	4	130	78	22	8	0	30	23	200
11.4	0	37	89	4	130	78	30	8	0	38	30	200
11.5	696	10	30	0	736	642	35	12	0	47	33	-
11.6	696	10	30	0	736	642	35	12	0	47	33	-
12.1	941	45	103	0	1089	937	35	12	0	47	36	1100
12.2	805	45	89	0	939	807	35	12	0	47	36	1100
12.3	812	45	89	0	946	814	35	12	0	47	36	1100
12.4	821	45	100	0	966	827	35	12	0	47	36	1100
12.5	898	59	220	0	1177	913	35	12	0	47	33	1100
12.6	892	59	220	0	1171	908	35	12	0	47	33	1100

Successful Tenders in TR31

Year 11 (2017/18)

This tender round was the final opportunity to tender for seasons 11.1 and 11.2, as such the most economic tenders were accepted to provide sufficient volume to meet the optimal level. For the winter (seasons 11.5 and 11.6), ~700MW of committed tenders was accepted. We have continued to de-value PF tenders based on the forecast of their availability profile during the premium windows; as such no PF tenders have been accepted for the winter seasons.

Year 12 (2017/18)

A significant volume of tenders had all or nothing restrictions across year 12 (most were for seasons 1-6 although a number of all of nothing tenders were for a combination of seasons). Procuring volume for committed STOR service for the winter seasons remains a priority, as such ~800MW of all or nothing across year 12 were accepted.

Tables demonstrating the breakdown of accepted and rejected tenders and average prices have been moved to the MIR Excel file.

Expectations for TR32

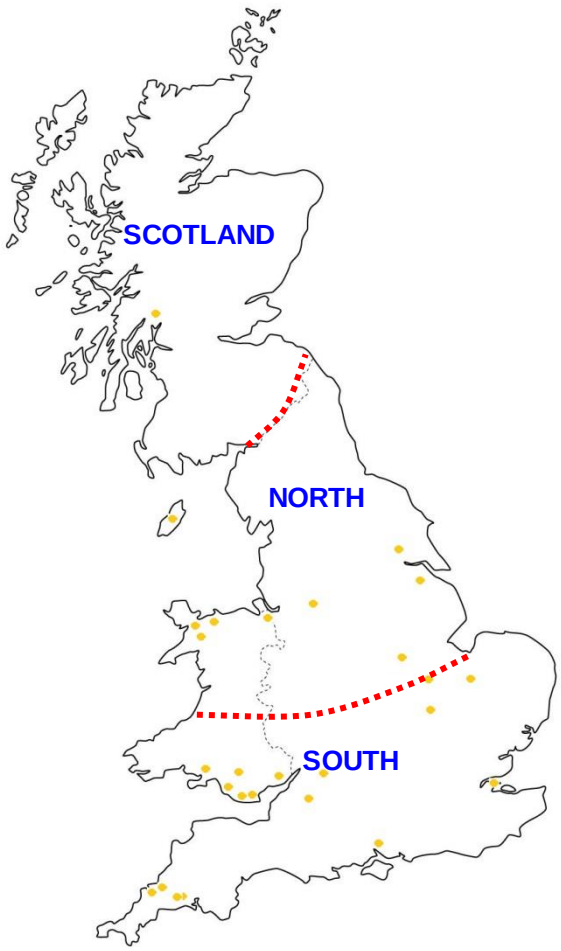
This section is designed to clarify our views for the next tender round, including remaining requirement and likely intentions.

- **Seasons 11.3 & 11.4:** accept all of the remaining requirement (~200-300MW) from committed or flexible tenders.
- **Seasons 11.5 & 11.6:** we will continue to review the winter capacity and monitor our requirement. The current requirement for seasons 11.5-11.6 has been satisfied. However, any terminations may be replaced if considered to be economic against alternative actions. PF units will continue to be assessed

at 0% availability during peak periods. Flexible units will be accepted in line with committed prices; high priced units are likely to be rejected at the week ahead assessment stage if there is a surplus of capacity.

Figure 3 presents the number of units and the total MW tendered and accepted for each season and each location. The orange dots on the map indicate the approximate location of the units tendered in any season (not including sites located in more than one region).

Figure 3 Map of Great Britain



SCOTLAND	Units tendered	Units Accepted	MW tendered	MW Accepted
11.1	-	-	-	-
11.2	-	-	-	-
11.3	-	-	-	-
11.4	1	-	3	-
11.5	1	1	3	3
11.6	1	1	3	3
12.1	1	1	3	3
12.2	1	1	3	3
12.3	1	1	3	3
12.4	1	1	3	3
12.5	1	1	3	3
12.6	1	1	3	3

NORTH	Units tendered	Units Accepted	MW tendered	MW Accepted
11.1	41	31	468	220
11.2	39	30	446	206
11.3	29	8	373	83
11.4	28	8	341	83
11.5	14	4	1,125	664
11.6	15	4	1,131	664
12.1	41	3	1,008	296
12.2	41	3	1,007	296
12.3	41	3	1,007	296
12.4	41	3	1,008	296
12.5	35	5	1,224	335
12.6	36	5	1,230	335

SOUTH	Units tendered	Units Accepted	MW tendered	MW Accepted
11.1	70	52	864	391
11.2	75	57	943	473
11.3	41	3	580	24
11.4	39	3	530	24
11.5	11	3	256	37
11.6	11	3	256	37
12.1	40	14	1,362	703
12.2	38	12	1,218	562
12.3	38	12	1,225	569
12.4	39	13	1,242	583
12.5	33	16	1,107	665
12.6	34	16	1,117	659

MULTIPLE LOCATIONS (Aggregated sites)

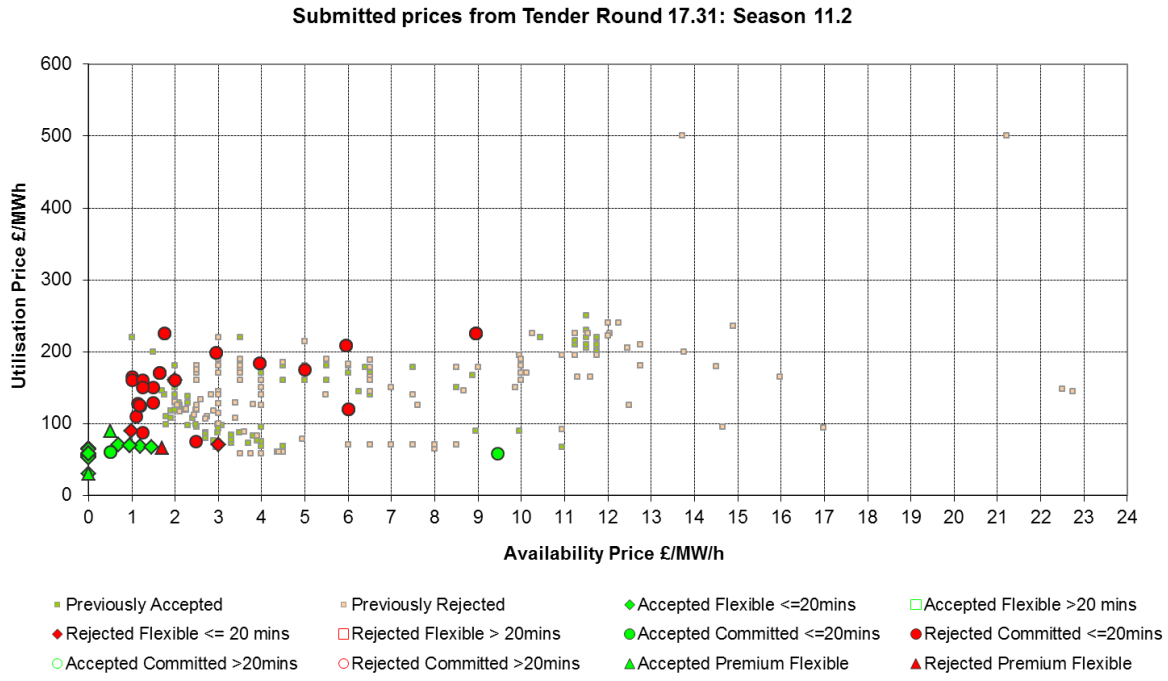
MULTIPLE	Units tendered	Units Accepted	MW tendered	MW Accepted
11.1	17	9	98	51
11.2	17	9	98	51
11.3	13	5	70	23
11.4	13	5	70	23
11.5	-	-	-	-
11.6	-	-	-	-

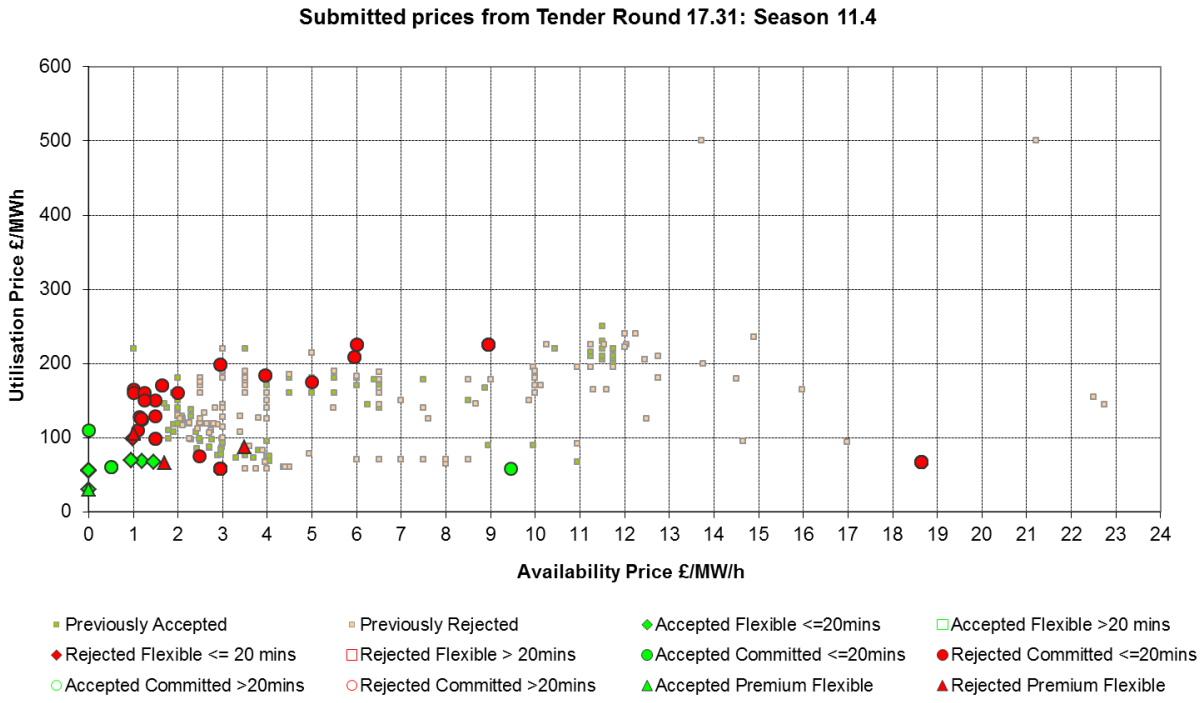
MULTIPLE	Units tendered	Units Accepted	MW tendered	MW Accepted
12.1	56	14	404	87
12.2	55	12	398	78
12.3	55	12	398	78
12.4	56	13	404	84
12.5	50	24	364	174
12.6	50	24	364	174

Prices

Figures 4 and 5 below show scatter plots of availability and utilisation price for each tender and for each season. The data is broken down into response time groups of >20 mins or <=20 mins, Flexible or Committed service and accepted or rejected tenders. These charts also display any units accepted as Premium Flexible, or rejected as Premium Flexible if they were not then assessed as Flexible. If a unit was rejected as Premium Flexible and then assessed as Flexible, they are represented on the chart as normal Flexible tenders. These charts also depict the accepted and rejected tenders from previous tender rounds. To keep this report short only seasons 2, 4 and 5 are displayed (these are the longest of each of the season pairs). The full data for all seasons is available in the MIR Excel file including the details of PF units and secondary assessment.

Figure 4 Year 11 Availability and Utilisation price charts





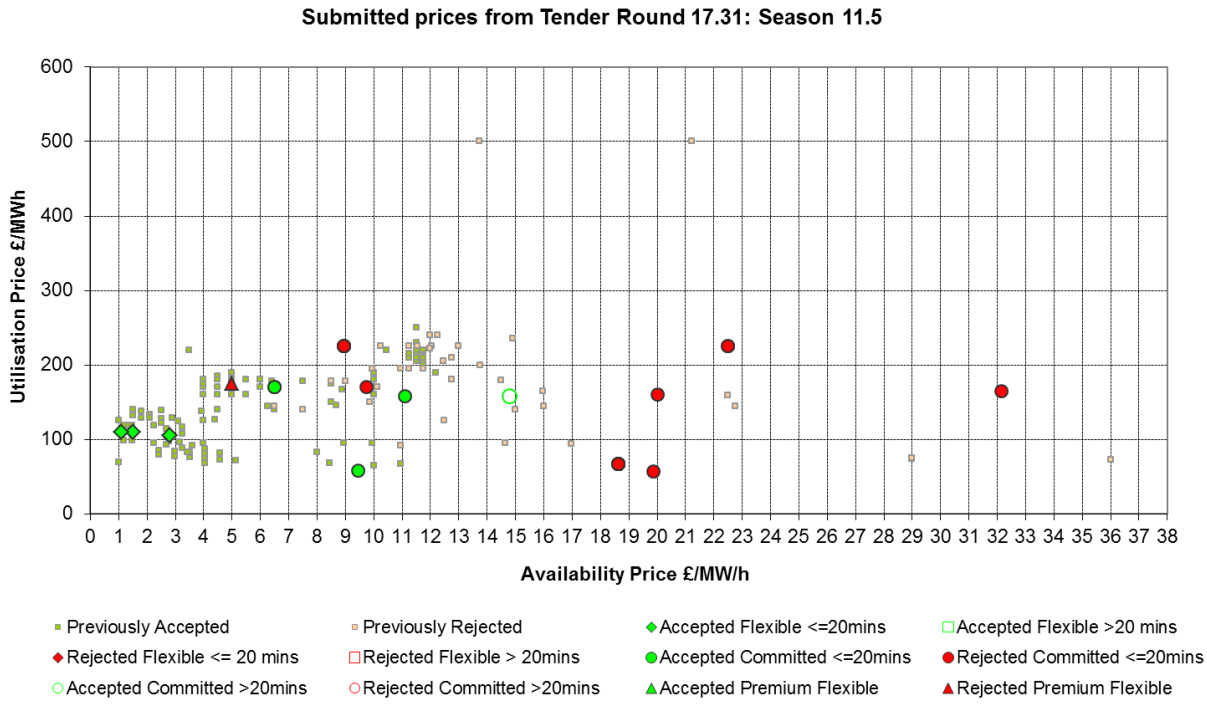
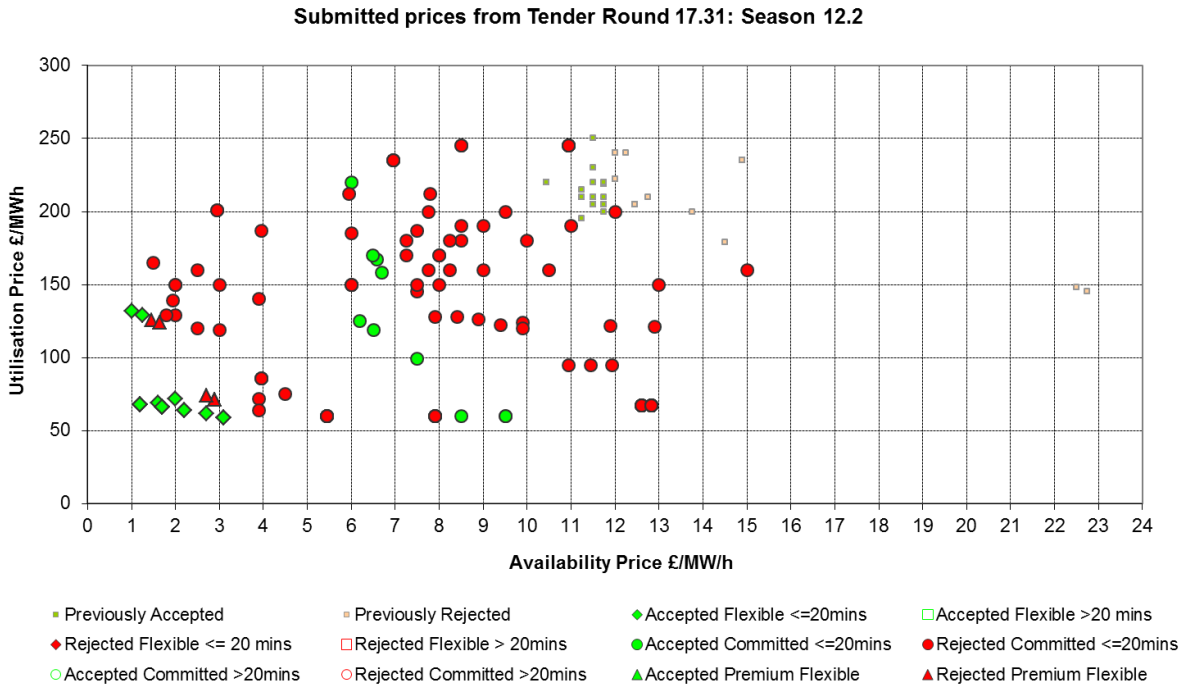
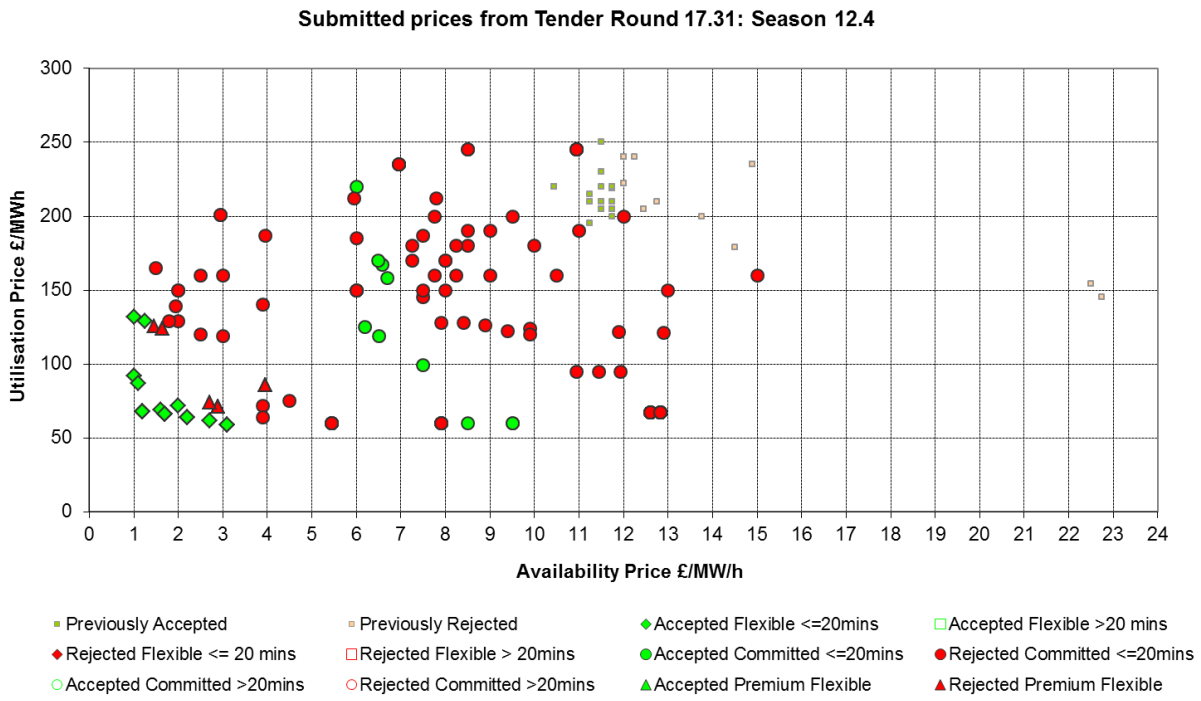


Figure 5 Year 12 Availability and Utilisation price charts





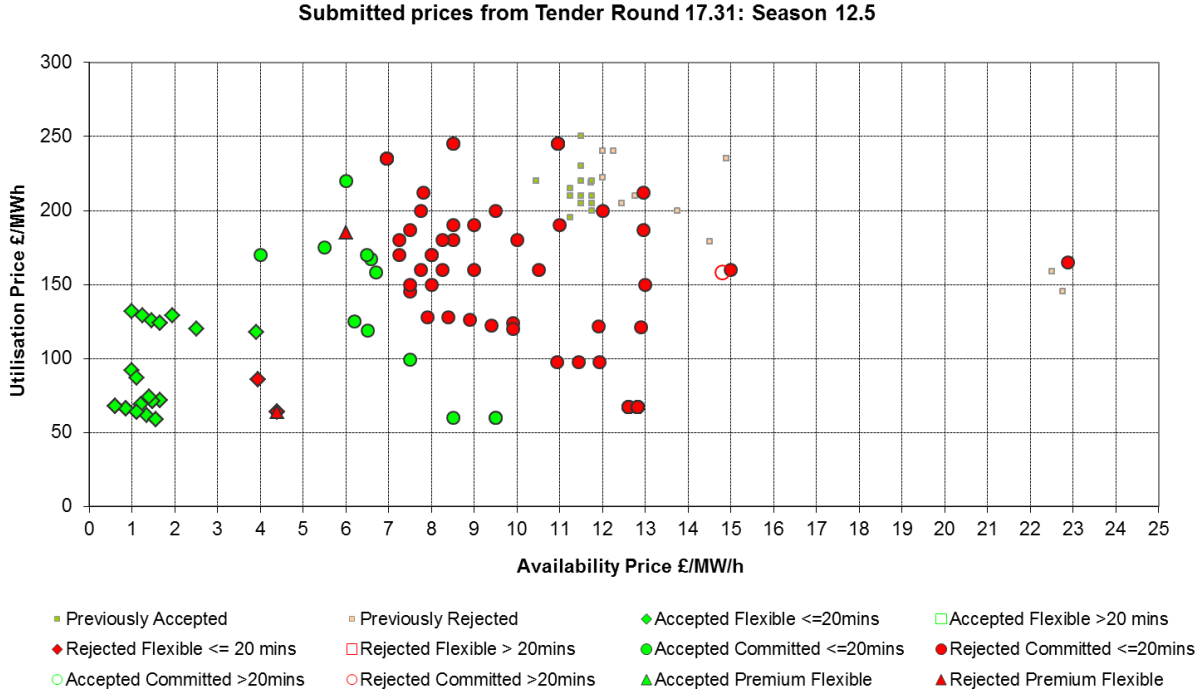


Table 3 below presents a summary of the highest accepted availability price for Committed and Flexible units with Premium Flexible tenders listed separately. The table also presents the highest and lowest Utilisation price accepted for each season as a guide. This is intended to display the difference in value between Premium Flexible and normal tenders, although it should be noted that it is the combination of utilisation and availability price that is key. This information can be seen on the scatter plots above. For this report we have added an extra column which is highest availability price accepted that is not from an "all or nothing" tender. This change is to help distinguish between "all or nothing" prices that were accepted due to their benefits in other seasons to those accepted for their benefit in the current season.

Table 3 Summary of accepted Prices

Season Number	Marginal Availability price accepted £/MW/h	Marginal Availability price accepted non all or nothing	Marginal PF availability price accepted £/MW/h	Highest Utilisation Price accepted £/MWh	Lowest Utilisation Price accepted £/MWh
11.1	9.45	1.45	0	90	30
11.2	9.45	1.45	0	90	30
11.3	9.45	1.45	0	110	30
11.4	9.45	1.45	0	110	30
11.5	14.80	9.75	-	170.00	57.89
11.6	14.80	9.75	-	170.00	57.89
12.1	9.50	3.10	-	235.00	58.98
12.2	9.50	3.10	-	235.00	58.98
12.3	9.50	3.10	-	235.00	58.98
12.4	9.50	3.10	-	235.00	58.98
12.5	9.50	5.50	-	235.00	58.98
12.6	9.50	5.50	-	235.00	58.98

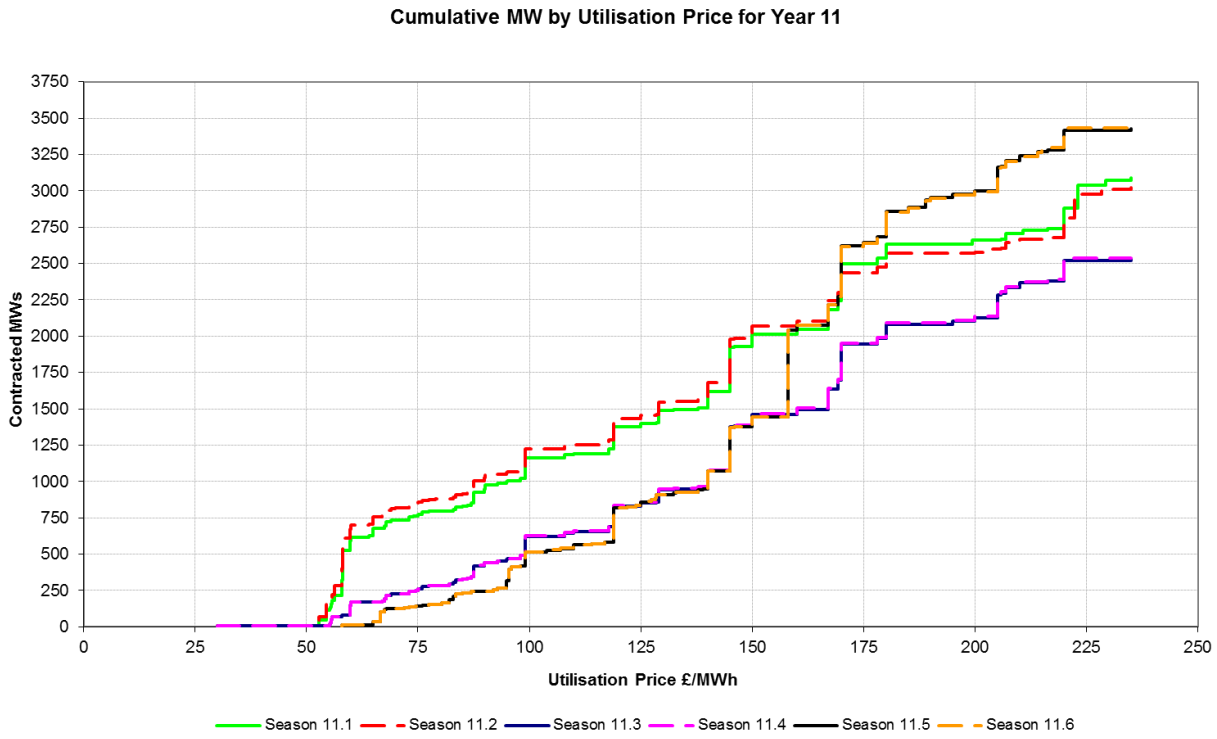
Figures 6 below shows the detail of all or nothing tenders. For simplicity multiple tenders of the same price are removed from the following charts. Also tenders which included PF as part of the all or nothing offer for winter are not displayed. Tenders that were accepted are colour green and rejected tenders coloured red.

Figure 6 All or nothing tenders.

Utilisation price and response time stacks

Figures 7 and 8 exhibit cumulative graphs. In these graphs the total accepted MW from previous tender rounds, up to and including the results from TR31, have been stacked according to two categories: **Figure 7a & 7b** is ranked according to utilisation price and **Figures 8a & 8b** according to the response time of the unit. **The utilisation prices have had indexation applied (seasonal and annual) these are final for season 11.1 but may change for the remaining seasons**.

Figure 7a illustrates that for seasons 11.1 and 11.2 approximately 2000MW of STOR is contracted with a utilisation prices of £150/MWh or less.



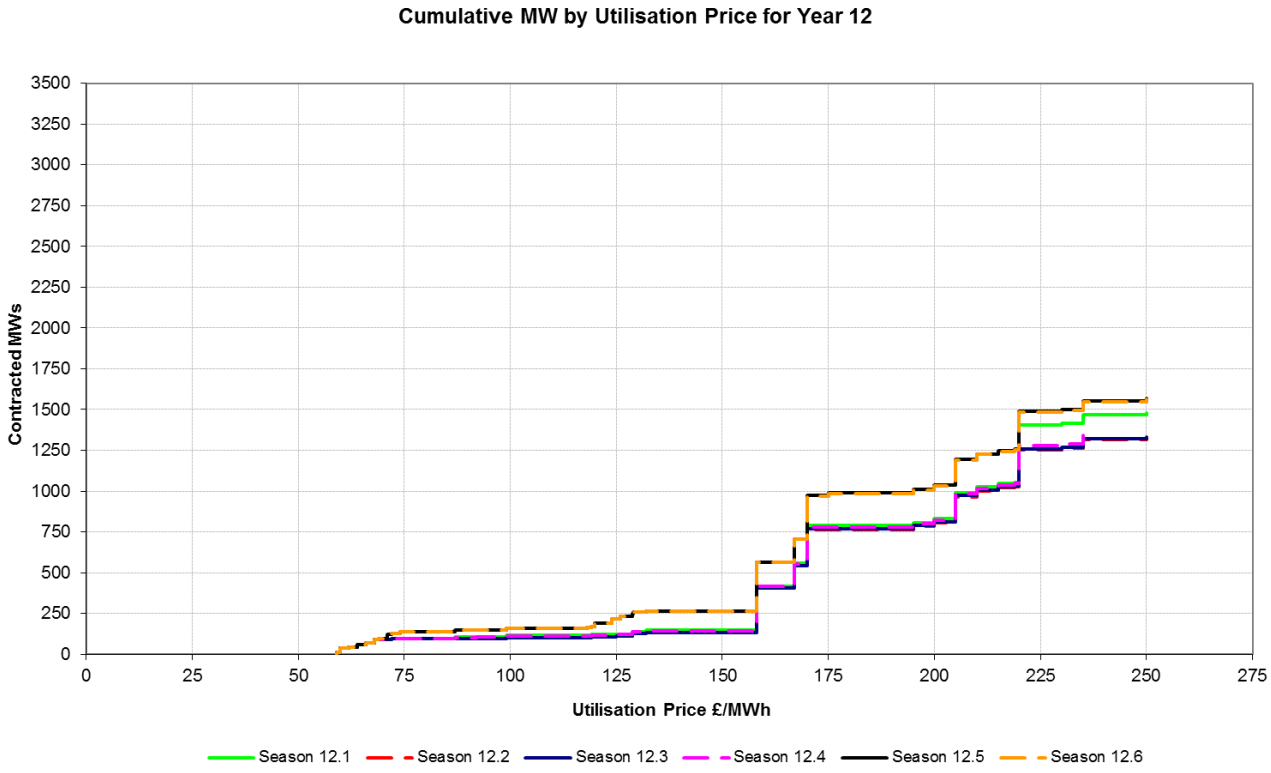
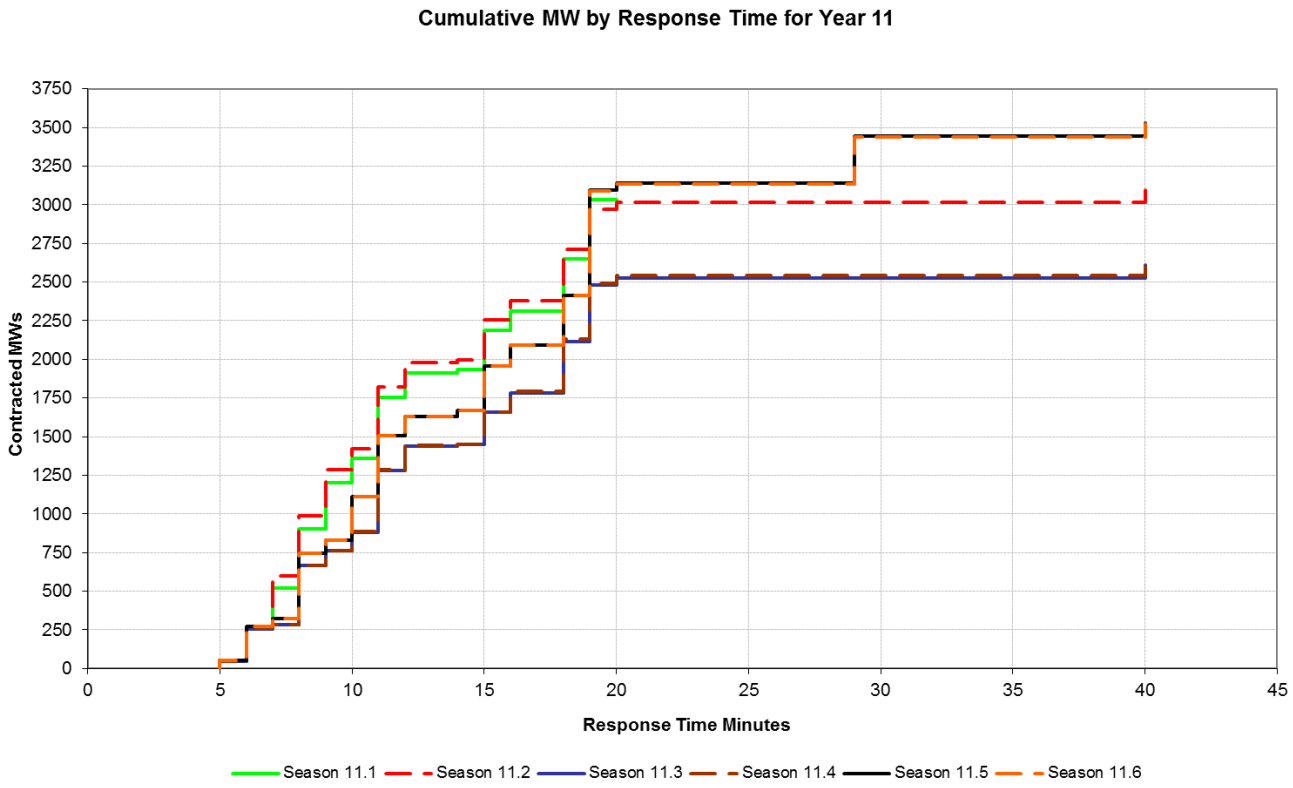
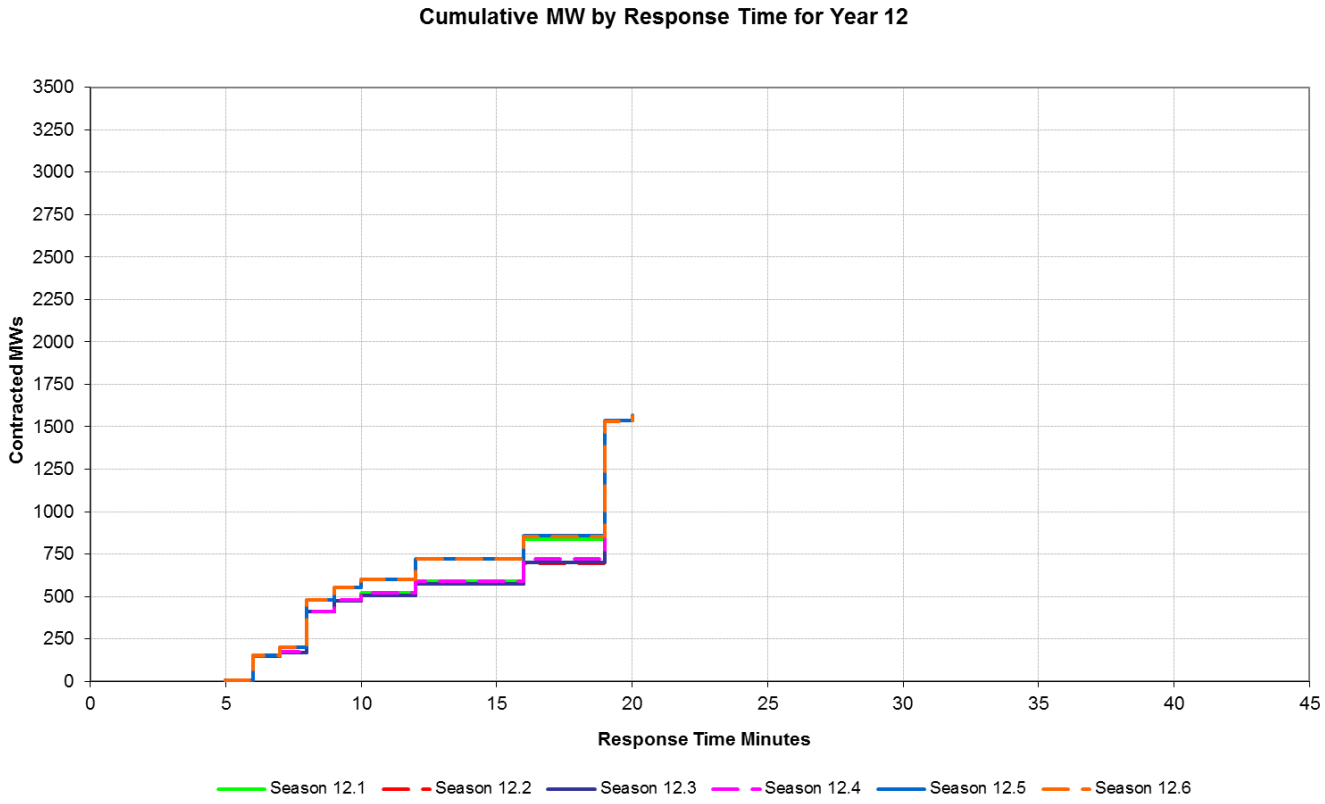


Figure 8a illustrates that for seasons 11.1 and 11.2 approximately 1300MW of STOR is contracted with a response time of 10 minutes or less.

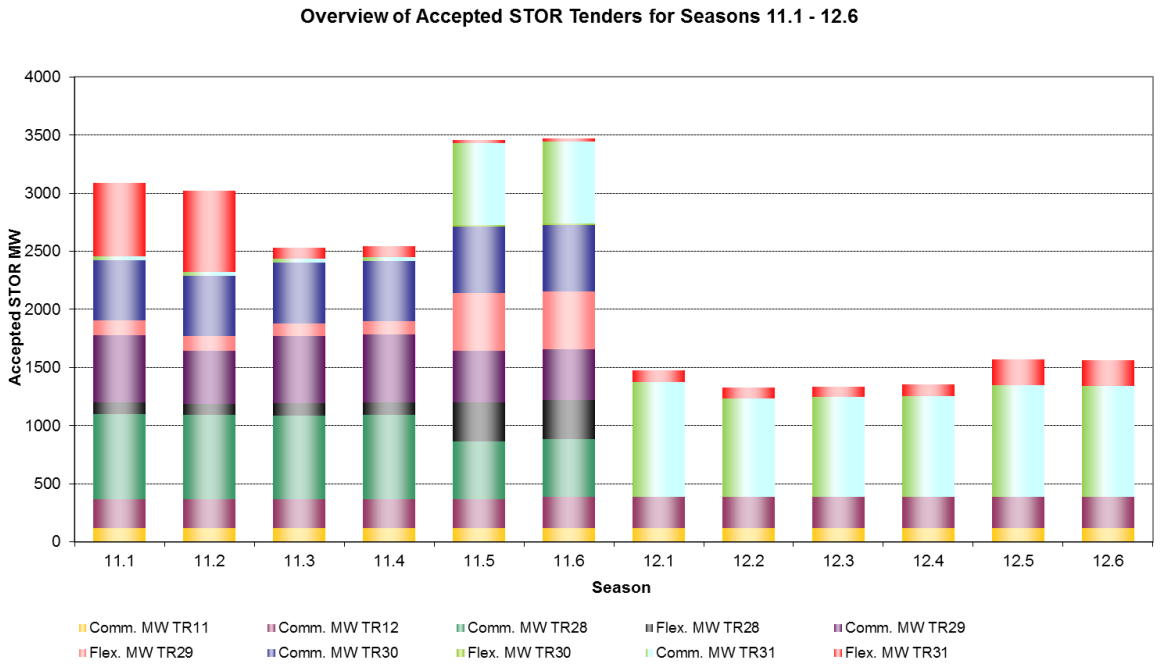




Total Contracted Position

Figure 9 shows the breakdown of accepted volumes from all previous tender rounds across the seasons of Years 11 and 12. The table accompanying Figure 9 below displays the same data in table format split by Committed or Flexible. For purpose of this chart and table Premium Flexible units are classed as Flexible units.

Figure 9 Year 11 and 12 summaries by tender round



	Season	11.1		11.2		11.3		11.4		11.5		11.6	
	Service Type	C	F	C	F	C	F	C	F	C	F	C	F
Accepted MW	TR11 (LT)	116		116		116		116		116		116	
	TR12 (LT)	253		251		252		253		254		274	
	TR28	733	95	728	92	720	107	724	110	493	340	493	340
	TR29	584	124	460	125	577	109	585	109	443	497	437	497
	TR30	519		519		519		519		571	10	571	10
	TR31	34	628	34	696	37	93	37	93	706	30	706	30
	Total	**2239**	**847**	**2108**	**913**	**2221**	**309**	**2234**	**312**	**2583**	**877**	**2597**	**877**

	Season	12.1		12.2		12.3		12.4		12.5		12.6	
	Service Type	C	F	C	F	C	F	C	F	C	F	C	F
Accepted MW	TR11 (LT)	116		116		116		116		116		116	
	TR12 (LT)	273		271		272		273		274		274	
	TR31	986	103	850	89	857	89	866	100	957	220	951	220
	Total	**1375**	**103**	**1237**	**89**	**1245**	**89**	**1255**	**100**	**1347**	**220**	**1341**	**220**

STOR Runway Tender details

In TR31 there were twelve tenders received, six of which were accepted as being economic when compared to tenders received in the main tender. A total of 87MW was received, with 60MW being committed, 15MW as flexible and 12MW as premium flexible.

Appendix 1: Terminology and Definitions

High level description of STOR:

STOR is designed to give National Grid sufficient Operating Reserve to replace sudden generation losses, or unpredictable changes in demand between four hours ahead of real time and real time and requires a large proportion of units to be available within 20 minutes. STOR also recognises that other potential reserve providers who cannot meet the 20 minute response time criteria can still be of value in meeting our reserve requirement. Hence a key aspect of the definition of the STOR product is that it extends the maximum response time to 240 minutes to allow alternative providers to participate. How value is placed on these units by National Grid is different to the sub 20 minute notice units as the longer notice units compete mainly with alternative options available in the Balancing Mechanism with equivalent response times. Location, reliability and utilisation parameters are also important elements of the STOR assessment.

The Committed service applies to all providers who wish to make themselves available for all required windows nominated by National Grid. Both BM and NBM providers can tender for this service. The Flexible service applies only to NBM providers and allows the provider to make the unit available or unavailable for particular windows. This availability is assessed on a week-ahead basis and providers are notified if their service is required or not. It is at the discretion of National Grid whether a unit is accepted or rejected at the week-ahead stage and this decision will be based on the same assessment principles as the main tender assessment. The increased accuracy of the week-ahead forecast means that some factors may have more importance such as location if specific constraint issues are forecast. Both Services attract an availability payment paid on a £/MW/h basis when available within defined windows and a utilisation payment on delivery of STOR MW when instructed by National Grid paid on a £/MWh basis.

A summary of the STOR service can be found on our website at the following link:

http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=8589934872

Appendix 2:

Accepted and Rejected Tenders TR31: A list of information containing prices, response time, location and unit type of all accepted and rejected tenders from this tender round, previously found in the appendix to the market information reports, can now be downloaded, in spreadsheet format, from the Market Information section of the STOR website:

http://www2.nationalgrid.com/UK/Services/Balancing-services/Reserve-services/Short-Term-Operating-Reserve/Short-Term-Operating-Reserve-Information/

Appendix 3: Season Reference

The following tables summarise the season information for the current year (Year 11) and the following year (Year 12).

Year 11 Seasons - 2017/18							
		WD		NWD		Indicative Hours	
Season	Dates	Start Time	End Time	Start Time	End Time	WD	NWD
1	05:00 on Saturday 1st April 2017 - 05:00 on Monday 24th April 2017	06:00 19:00	13:00 21:30	10:00 19:30	14:00 21:30	105.00 37.50	32.00 16.00
2	05:00 on Monday 24th April 2017 - 05:00 on Monday 21st August 2017	06:30 16:00 19:30	14:00 18:00 22:00	10:30 19:30 -	13:30 22:00 -	750.00 200.00 250.00	57.00 47.50 -
3	05:00 on Monday 21st August 2017 - 05:00 on Monday 25th September 2017	06:30 16:00	13:00 21:00	10:30 19:30	12:30 21:30	188.50 145.00	12.00 12.00
4	05:00 on Monday 25th September 2017 - 05:00 on Monday 30th October 2017	06:00 17:00	13:00 20:30	10:30 17:30	13:00 20:00	210.00 105.00	12.50 12.50
5	05:00 on Monday 30th October 2017 - 05:00 on Monday 29th January 2018	06:00 16:00	13:00 20:30	10:30 16:00	13:30 19:30	525.00 337.50	48.00 56.00
6	05:00 on Monday 29th January 2018 - 05:00 on Sunday 1st April 2018	06:00 16:30	13:00 20:30	10:30 16:30	13:00 20:00	378.00 216.00	20.00 28.00
						3,447.5	353.5

Season	WD	NWD
1	15	8
2	100	19
3	29	6
4	30	5
5	75	16
6	54	8

Year 12 Seasons - 2018/19							
		WD		NWD		Indicative Hours	
Season	Dates	Start Time	End Time	Start Time	End Time	WD	NWD
1	05:00 on Sunday 1st April 2018 - 05:00 on Monday 30th April 2018	06:00 19:00	13:00 21:30	10:00 19:30	14:00 21:30	161.00 57.50	24.00 12.00
2	05:00 on Monday 30th April 2018 - 05:00 on Monday 20th August 2018	06:30 16:00 19:30	14:00 18:00 22:00	10:30 19:30 00:00	13:30 22:00 00:00	705.00 188.00 235.00	54.00 45.00
3	05:00 on Monday 20th August 2018 - 05:00 on Monday 20th September 2018	06:30 16:00	13:00 21:00	10:30 19:30	12:30 21:30	188.50 145.00	12.00 12.00
4	ay 20th September 2018 - 05:00 on Monday 29	06:00 17:00	13:00 20:30	10:30 17:30	13:00 20:00	210.00 105.00	12.50 12.50
5	05:00 on Monday 29th October 2018 - 05:00 on Monday 28th January 2019	06:00 16:00	13:00 20:30	10:30 16:00	13:30 19:30	525.00 337.50	48.00 56.00
6	05:00 on Monday 28th January 2019 - 05:00 on Monday 1st April 2019	06:00 16:30	13:00 20:30	10:30 16:30	13:00 20:00	378.00 216.00	22.50 31.50
						3,451.5	342.0

Season	WD	NWD
1	23	6
2	94	18
3	29	6
4	30	5
5	75	16
6	54	9