CADL Review: 1st August 2021 to 31st July 2022

Introduction

National Grid Electricity System Operator (NGESO) has been requested by the BSC panel, through its proxy the Imbalance Settlement Group (ISG), to provide analysis to the ISG to allow it to draw conclusions as to the appropriate level with which to set the Continuous Acceptance Duration Limit otherwise known as CADL.

The CADL methodology aims to identify, and exclude from the imbalance price calculation, those Bid Offer Acceptance (BOA) actions deemed as taken for Fast Reserve. These actions may require above average ramping ability in order to fulfil their task of managing intra half hour energy imbalance. Given that these actions may require dynamic characteristics that is beyond those available to the majority of Balancing Mechanism Units (BMUs), there is the possibility that these actions may be taken out of cost merit.

The CADL function does not explicitly tag which actions should be classified as Fast Reserve. It employs a pragmatic solution to removing these actions from the imbalance price; it assumes that the duration of the BOA instruction, or set of concatenated BOA instructions, utilised to resolve intra half hour issues, will be shorter than the average BOA duration.

The CADL duration limit was reduced to 10 minutes from 15 minutes on 1st April 2019.

Methodology

1. Defining Fast Reserve Actions

For the purpose of this analysis, BMUs delivering Fast Reserve actions are deemed to be those that fulfil the following conditions (individually or in groups):

- Initial ramp rate is greater than or equal to 25MW/min; and
- BOA size is greater than or equal to 25MW; and
- Start point is greater than or equal to the unit's Stable Export Limit (SEL), unless it's a hydro or battery or OCGT station.

This definition of Fast Reserve reflects the latest minimum dynamic characteristics required by NGESO in order for BMUs to be eligible to provide Fast Reserve. Since 25th March 2019 there was a change made to the Fast Reserve requirements; the minimum BOA size was reduced 25MW, from 50MW. Please note Fast Reserve is utilised on both contracted and non contracted units. This CADL Review has considered Fast Reserve actions since the change was implemented.

The methodology of assessing the BOA dynamics provides an accurate view of the Fast Reserve actions employed by NGESO. This paper does not provide

a view on the relative merit order of Fast Reserve BOAs as compared to non-Fast Reserve BOAs.

However, since the introduction of P217A (5th November 2009) the imbalance price mechanism now utilises a pragmatic approach of determining whether CADL actions were in merit order. Elexon, when considering P217A, will examine the impact of Fast Reserve actions upon cash out.

2. Concatenating Acceptances

All instructions in this analysis have been concatenated. If a BMU receives a number of Bid Offer Acceptances (BOA) that either overlap or immediately follow each other, then this is classed as one instruction and will be counted only once in the duration of instruction analysis. The duration will be deemed the length of all the concatenated instructions.

Results

The above methodology has been used to assess all BOA instructions over a 12 month period, from 1st August 2021 to 31st July 2022.

The analysis has focused on the following areas:

1) Fast Reserve and Plant Type
2) BOA Volumes flagged by CADL
3) Number of Fast Reserve and Non Fast Reserve BOAs

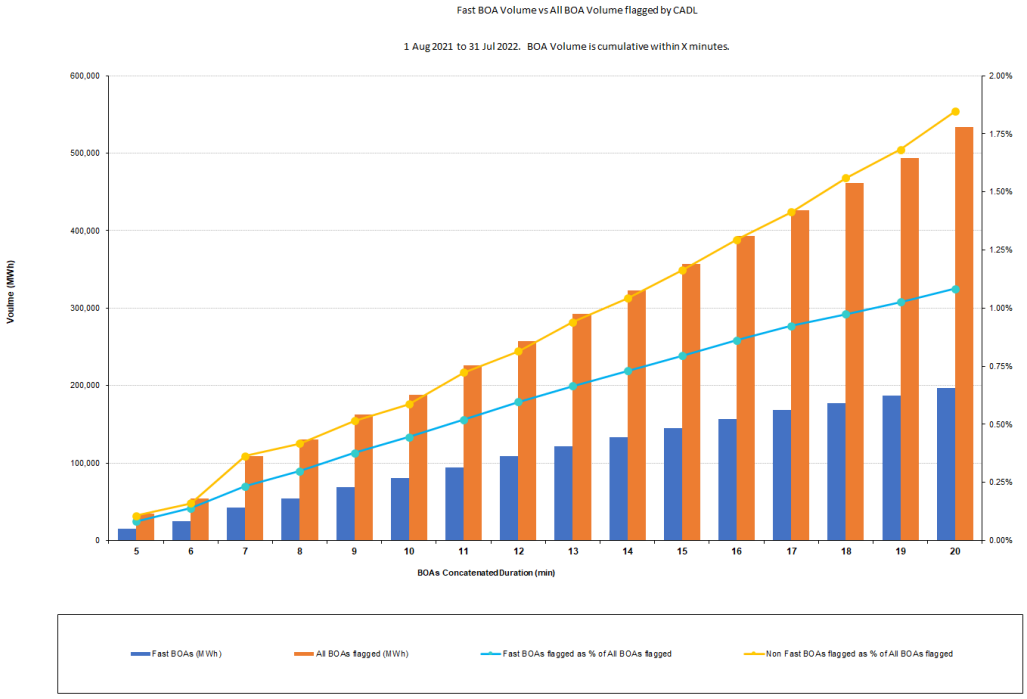
1. Fast Reserve and Plant Type

Applying the described methodology, 5 hydro stations, 14 gas stations, a diesel station and a battery station delivered Fast Reserve over the assessment period. The hydro stations delivered 94.2% of all Fast Reserve BOAs in the reporting period.

2. BOA Volumes flagged by CADL

Volumes flagged by the CADL process have been analysed in regard to the current CADL rules, in summary any BOA or concatenated BOA has been assessed against the duration of the instruction. BOA volumes have been classed as either Fast BOA volumes or non Fast BOA volumes.

The following chart shows the volume of actions flagged by the CADL process in relation to a CADL limit set between 5 and 20 minutes. The chart illustrates the volume of Fast Reserve BOAs and non Fast Reserve BOAs as a percentage of the total BOA volume, at each CADL limit.



The table below summarises the information displayed in the previous chart.

Duration (min) (cumulative)	Volume flagged by CADL (01 Aug 2021 to 31 Jul 2022)					
	Fast BOAs (MWh)	All BOAs flagged (MWh)	Fast BOAs as % of All BOAs flagged	All BOAs flagged as % of All BOAs	Fast BOAs flagged as % of All BOAs flagged	Non Fast BOAs flagged as % of All BOAs flagged
5	14,887	34,421	43.3%	0.2%	0.1%	0.1%
6	25,333	54,484	46.5%	0.3%	0.1%	0.2%
7	42,571	108,834	39.1%	0.6%	0.2%	0.4%
8	54,519	130,706	41.7%	0.7%	0.3%	0.4%
9	68,570	162,323	42.2%	0.9%	0.4%	0.5%
10	81,001	187,783	43.1%	1.0%	0.4%	0.6%
11	94,670	226,413	41.8%	1.2%	0.5%	0.7%
12	108,665	257,084	42.3%	1.4%	0.6%	0.8%
13	121,145	292,428	41.4%	1.6%	0.7%	0.9%
14	133,113	323,208	41.2%	1.8%	0.7%	1.0%
15	144,845	356,759	40.6%	2.0%	0.8%	1.2%
16	157,064	393,073	40.0%	2.2%	0.9%	1.3%
17	168,227	425,849	39.5%	2.3%	0.9%	1.4%
18	177,507	461,843	38.4%	2.5%	1.0%	1.6%
19	187,064	493,538	37.9%	2.7%	1.0%	1.7%
20	197,227	533,729	37.0%	2.9%	1.1%	1.8%

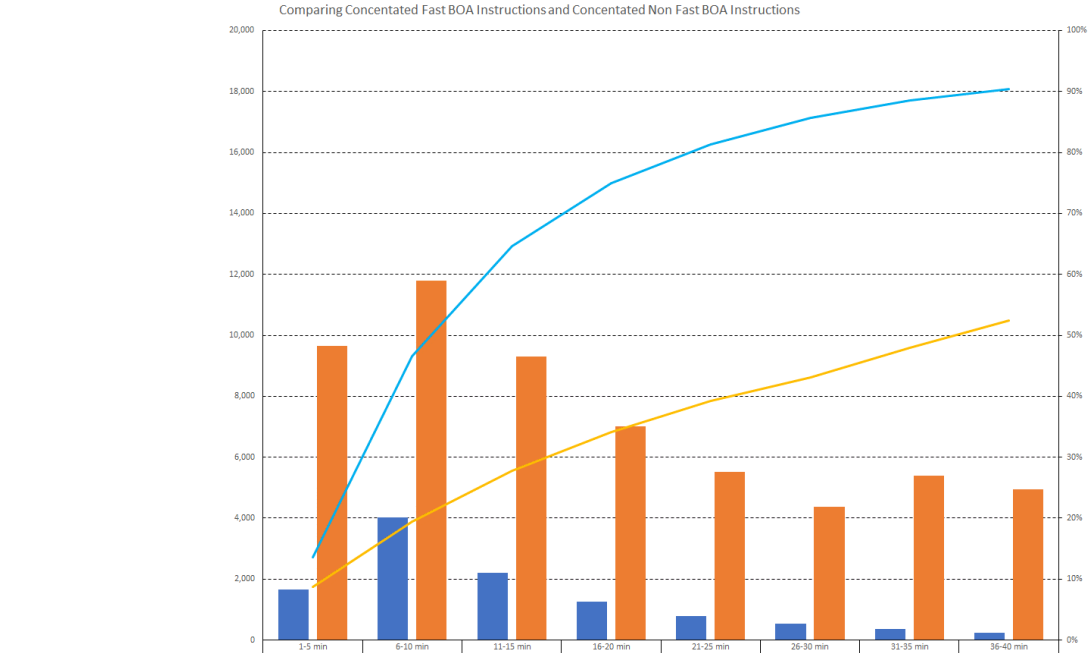
- From the total volume flagged by the current CADL limit of 10 minutes, 43.1% were Fast Reserve BOAs.

- The current CADL limit of 10 minutes flagged 1.0% of all BOAs instructed by NGESO, of which 0.4% of all BOAs were related to Fast Reserve.

3. Number of Fast Reserve and Non Fast Reserve BOAs

As well as examining volumes flagged by CADL, the number of BOA instructions has also been considered. All instructions taken over the assessment period have been categorised as either Fast Reserve BOAs or non Fast Reserve BOAs in regard to the outlined methodology. The table and graph below illustrates the number of BOA instructions, categorised by BOA duration.

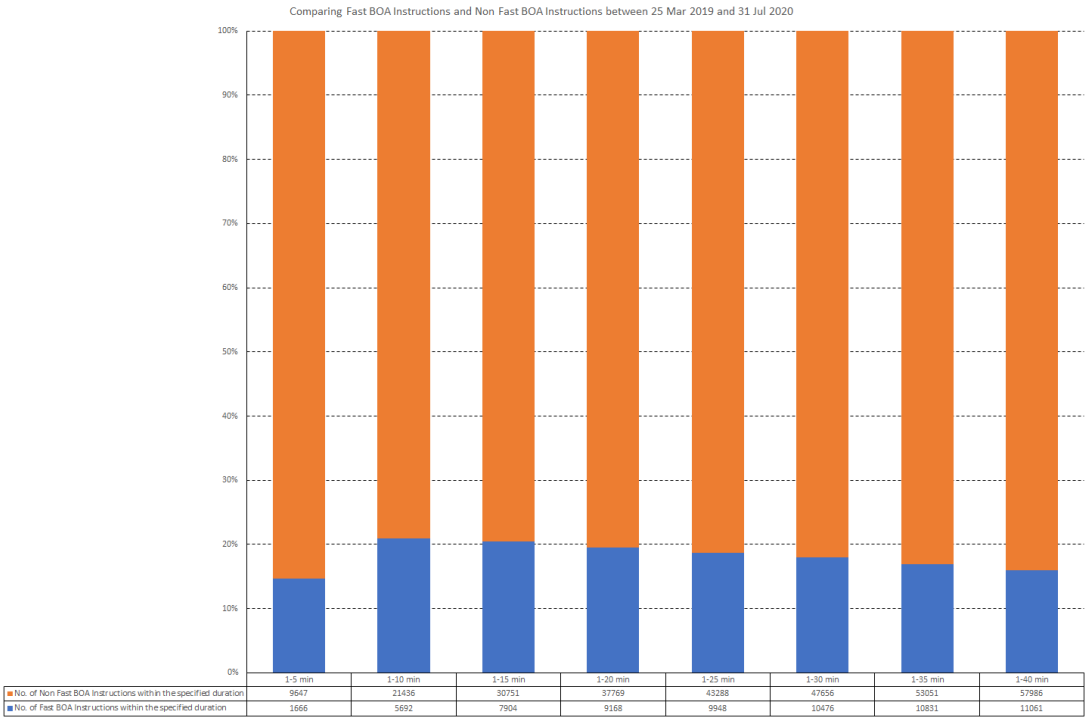
- The bar chart shows the number of BOA instructions split by their duration (0 to 5 minutes, 5 to 10 minutes, 10 to 15 minutes, and so on).
- The line chart shows the cumulative distribution of both Fast Reserve and non Fast Reserve BOA Instructions, for example 14% of the Fast Reserve BOA instructions lasted for 5 minutes or less, 47% of the Fast Reserve BOA instructions lasted for 10 minutes or less, 65% of the Fast Reserve BOA instructions lasted for 15 minutes or less, and so on.



	1-5 min	6-10 min	11-15 min	16-20 min	21-25 min	26-30 min	31-35 min	36-40 min
No. of Concentated Fast BOA Instructions	1666	4026	2212	1264	780	528	355	230
No. of Concentated Non Fast BOA Instructions	9647	11789	9315	7018	5519	4368	5395	4935
% of Cumulative No. of Concentated Fast BOA Instructions	14%	47%	65%	75%	81%	86%	89%	90%
% of Cumulative No. of Concentated Non Fast BOA Instructions	9%	19%	28%	34%	39%	43%	48%	52%

- The number of Fast Reserve BOA instructions peaked in the 6 to 10 minute duration category.
- The number of non Fast Reserve BOA instructions peaked in the 6 to 10 minute duration category.
- The current CADL limit of 10 minutes captured 47% of Fast Reserve BOA instructions over the assessment period.
- The current CADL limit of 10 minutes captured 19% of non Fast Reserve BOA instructions over the assessment period.

The following chart shows the proportion of Fast Reserve and non Fast Reserve BOA instructions, grouped by duration.



- The proportion of Fast Reserve BOA instructions compared to non Fast Reserve BOA instructions peaks in the 1-10 min interval.