nationalgridESO

EBGL A16.6 Exemption Proposal-
Supporting Justification

Executive summary

NGESO are seeking an exemption to the Electricity Balancing Guideline (EBGL) requirement that states prices for Balancing energy bids shall not be pre-determined in contracts. We believe that this is currently the most economically efficient course of action for the GB market, because removal of these prices will lead to greater risk and exposure to volatility in balancing costs. The current arrangements of a fixed utilisation price delivers more benefit to consumers than a variable utilisation cost. This document provides further justification and rationale following Ofgem's letter dated 4 June 2019, which request further information in support the exemption proposal.

We are committing to a reform of our Reserve services in our Forward plan and RIIO T2 Business Plan. It is our intention to review the exemption request in the future once the reforms have been finalised.

Purpose of this Report

Article 16.6 of the Electricity Balancing Guideline states:

"The price of the balancing energy bids or integrated scheduling process bids from standard and specific products pursuant to paragraph 4 shall not be predetermined in a contract for balancing capacity. A TSO may propose an exemption to this rule in the proposal for the terms and conditions related to balancing set-up pursuant to Article 18. Such an exemption shall only apply to specific products pursuant to Article 26(3)(b) and be accompanied with a justification demonstrating higher economic efficiency."

For GB this means that we are required to remove utilisation prices from contracts for balancing energy. The products which would be impacted by this requirement are; Short Term Operating Reserve (STOR) and Fast Reserve (FR). Previously, we have considered Demand Turn Up (DTU) however this is being discontinued as a service and so in this paper we only consider STOR and FR.

The EBGL gives TSOs the right to propose an exemption to this requirement as part of the Terms and Conditions related to balancing pursuant to Article 18. In our amended proposal for Article 18 we have included the proposal that GB is granted this exemption.

This document provides **further justification** and rationale following **Ofgem's letter dated 4 June 2019**. Specifically, Ofgem requested further information to demonstrate why the exemption leads to higher economic efficiency for GB. The concerns were in four areas which are outlined in this report:

1. The expected changes in utilisation prices per balancing service if those are not contracted in advance, with a description on why the proxy chosen to simulate the change is appropriate.
2. The ESO's expectations on the changes to the availability prices in a market where utilisation prices are no longer fixed and the rationale for such a change.
3. An analysis of alternatives available to the ESO in real time to those services and how this can affect the submitted prices and hence economic efficiency.
4. A clear articulation of how all the factors considered lead to higher economic efficiency in GB.

These four areas are taken in turn in the supporting analysis section after further information about the products.

What are these products used for in the GB Market?

Keeping the system balanced and ensuring security and quality of supply at all times requires a combination of several linked continuous processes. These take place over different time horizons and in different markets, ranging from years ahead in the wholesale electricity market or contracted services, through to real-time in the balancing mechanism (BM) and balancing services.

NGESO procure a range of services to balance demand and supply and to ensure the security and quality of electricity supply across Britain's transmission system. Products such as STOR and FR are contracted ahead of time to ensure that there is sufficient capacity to cover NGESO Operating Reserve Requirements. Prices are submitted by providers, and are accepted ahead of time as part of the tender process. Submitted tender prices are compared to the costs of alternatives to deliver the equivalent level of volume, which ensures that the most economic action is taken.

Economic efficiency is central to the assessment principles which are used to decide how much volume should be procured and which tenders should be accepted for each of these products. More information on this can be found on our website, within the assessment process section of each balancing service.

The utilisation price submitted by providers as part of their tender submission is a significant factor when assessing the bids and deciding which make economic sense to accept. It means that NGESO have a full picture of risks that we will be exposed to upon awarding a contract to the provider. This allows us to lock in liquidity and mitigate risks of high or volatile prices close to real time. Without these prices, there is no certainty for the System Operator of cost and an increased risk of higher than necessary costs to the end consumer.

By providing longer term price signals we can be sure of a larger amount of reserve in control timescales.

Removal of Utilisation Price – Compatibility with current Services

Removing the utilisation price from contracts in the context of the existing Balancing Services arrangements would increase risk. NGESO look to secure a proportion of its reserve requirement via tenders in an economic and efficient manner. Accepted tenders are accepted such that the total costs of securing the Reserve and operating the system are lower than without the selection of these tenders. The selection process uses both utilisation and availability prices to determine if it is economically efficient to accept a tender. Securing these volumes and prices ahead of time is important to allow us ensure that we have enough volume available to meet requirements and operate the system securely in an economic way. If the utilisation price was to be removed from this process, then we would have to lock in volume based solely on availability prices. This would expose us to greater risks of increased balancing costs to the end consumer, as prices submitted close to real time are more likely to be volatile. For more information on this please see the analysis below.

Furthermore, there is a risk that removing the utilisation price from this process could create gaming opportunities for market participants. Providers' tenders would be accepted based on the availability price, which they would receive for being on call to provide energy if required. However, when a requirement arises for the activation of these products, NGESO would need to do this based on utilisation prices. A provider could submit high prices which are highly unlikely to be accepted. This would create the opportunity for providers to collect an availability payment with the intention of never actually being available to provide the energy. This puts NGESO at the risk of spending money which does not guarantee volume to be available, meaning that consumer money is spent unnecessarily.

As well as this, once providers have been accepted upon the basis of their availability price, they have the ability to set high prices in the knowledge that if required we may be forced to take these prices in the event of a shortfall at short notice.

The Future of Balancing Services

We know from stakeholder feedback that our balancing services need to change. Feedback from market parties via the System Needs and Product Strategy document, and recent feedback from Ofgem via the RIIO2 sector specific consultation are examples of this. NGESO have initiated a large programme of work focussed on improving our suite of balancing products. This work includes reforming our reserve products and facilitating closer to real-time markets, ensuring that they function well alongside European standard products. We believe that our work on reserve reform will provide the right market environment to allow the removal of utilisation prices from longer term contracts. Our commitments to reserve reform will be released as part of our Forward plan and RIIO ambitions in the coming months, and a proposal for the Reserve Reform work will be released later in the year. Until these improvements are in place we believe that utilisation prices provide certainty for future reserve levels.

Supporting Analysis for STOR

The expected changes in utilisation prices for STOR

STOR comes from units that have specific technical characteristics and so represent a sub-set of the units available in the Balancing Mechanism.

The benefit the consumer obtains from the use of utilisation pricing has increased rapidly over recent years.

The benefit has increased from £1.4m in financial year 2015-16 to £22.5m in financial year 2017-18.

The distribution of the benefit of utilisation pricing has become much more long-tailed: that is, it is dominated by the relatively few occasions when the imbalance price is very high. This trend has become much more pronounced in recent years.

In financial year 2017-18 80% of the total benefit came from just 20% of the occasions on which STOR was used, and 50% of the benefit came from just 4% of the occasions.

The Proxy Price model that is used by the ESO STOR assessment process is relatively insensitive to the assumptions in the model.

This implies that there is real customer benefit from retaining utilisation pricing in STOR contracts, and justifies the A16.6 exemption.

Proxy Price

There is no exact way to know what would have occurred if there had been no contracted utilisation prices in operation during the period 1 April 2015 to 31 March 2018. Market conditions would have set the price offered by STOR units, and we cannot know with certainty what prices STOR units would have offered.

However, there are some general principles that allow us to calculate a proxy price for the hypothetical offered price.

In the current STOR auction process potential STOR providers submit an availability price and a utilisation price. The worst outcome for a successful unit is, after having been accepted for the contract, then not to be called when STOR services are required because their utilisation price is too high. STOR units cannot operate in other markets during their availability window, so they only generate further income if they collect their utilisation fee. Therefore the ESO assessment procedure assumes that in the tendering process a STOR unit will set its utilisation price at the marginal cost of running the unit, and all fixed costs and risk premiums will be included in the availability price. This implies that the utilisation price is a good measure of the marginal run cost for that unit.

Secondly, STOR providers are providing a scarce resource: most BM units do not have the technical ability to provide energy on the short time-scales required by the ESO Control Room when they instruct a STOR unit. Hence STOR units would be able to set a price in the BM above the marginal imbalance price and be confident that they would be taken out of the general merit order by virtue of their additional technical capabilities: this is effectively a scarcity rent. The ESO assessment model assumes they would come in at precisely the imbalance price: this is likely to be an underestimate of the price they could command, but it is not clear how one could effectively build a model to represent the probable higher price

This justifies the use of proxy price:

$$Proxy\ Price = \max(STOR\ Price, Imbalance\ Price)$$

The Proxy Price model has the uncomfortable property that there is always a non-negative benefit attached to using STOR utilisation prices. However, this is common to all models of optional hedging strategies, and is equivalent to a call option, with the availability price playing the role of the premium.

Even if there were some small negative benefit associated with the utilisation price, as we discuss later the long-tailed nature of the proxy price distribution means that the error from ignoring the negative benefit is negligible. This is shown in the sensitivity section later.

Analysis

We examined all settlement periods between 1 April 2015 and 31 March 2018 during which STOR units were utilised. For each settlement period we calculated the volume weighted STOR utilisation price and calculated the equivalent proxy price. The STOR utilisation benefit was defined as the difference between proxy price and the volume weighted STOR price.

For periods when the imbalance price was less than or equal to the volume weighted STOR price this implies the benefit was £0: this means that the price paid for the required STOR units in those settlement periods would have been the same, regardless of whether there is a utilisation price or a market price.

In periods when the imbalance price was greater than the volume weighted STOR price this implies the benefit was positive, and the consumer is benefiting from the use of utilisation prices.

The total benefit for the three financial years (labelled by the start of the financial year) is:

Year	Benefit (£m)
2015	1.4
2016	16.1
2017	22.5

Table: Yearly Benefit in £m

This clearly shows that the benefit the consumer is receiving from the use of utilisation pricing in STOR contracts is increasing.

The increase has been driven by the changing shape of the imbalance price distribution which is becoming progressively more long tailed (that is, relatively few occasions when the price is exceptionally high come to dominate the total distribution). There are many reasons why this is the case, but among them are the policy decision to ensure that transmission assets are used to their maximum capacity in order to reduce spend on new assets; and the decision to move to PAR1 imbalance pricing, which makes the price more volatile at the top end.

Next we examine the distribution of the benefit across all 3 financial years

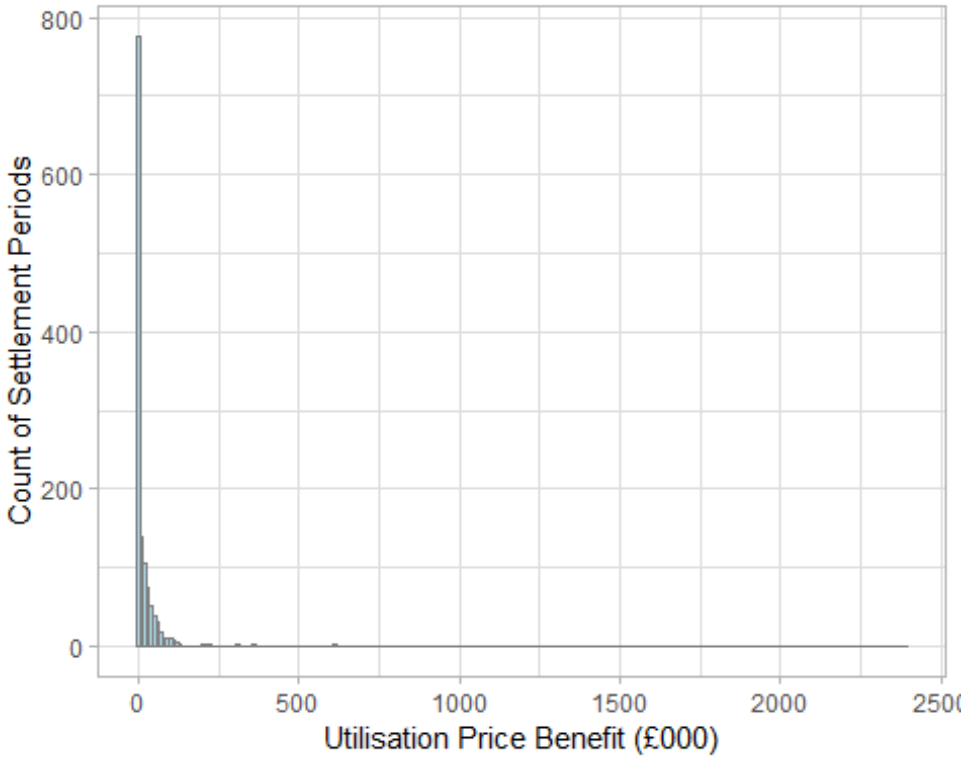
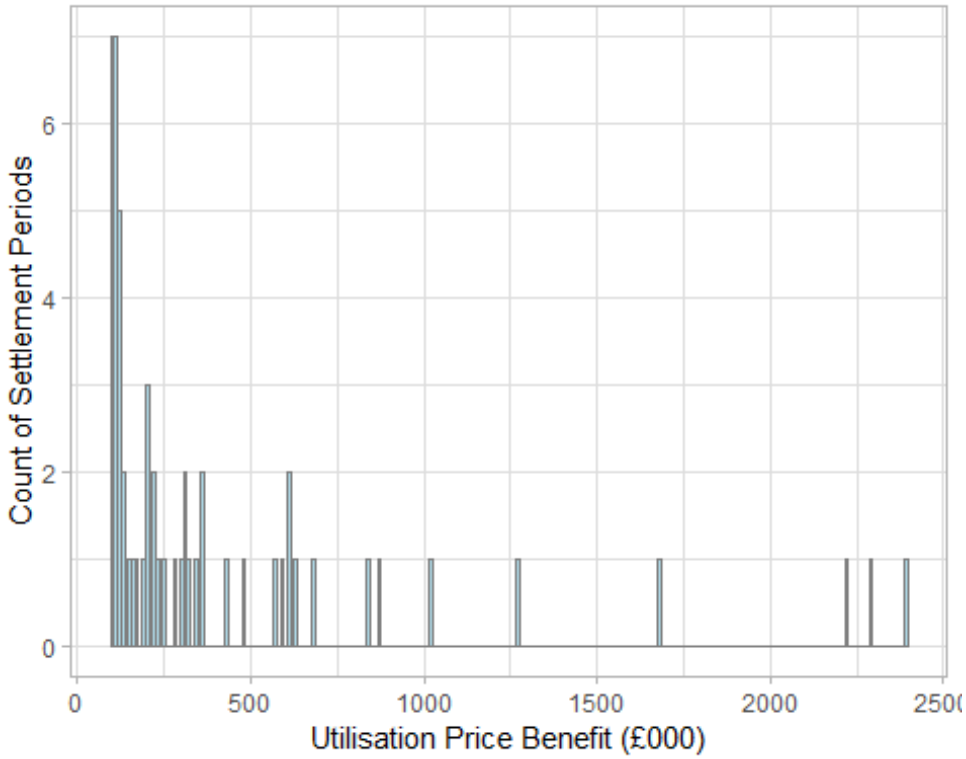


Figure: Utilisation Benefit 2015 – 2018

We can see that in the majority of cases there is no difference in the STOR price between current arrangements with utilisation prices, and the hypothetical world without utilisation prices. However, the distribution of benefit is long-tailed, with a few settlement periods where there is very significant positive benefit.

To identify these more clearly we zoom into the tail, focussing on occasions when benefit is more than £100,000:



Utilisation Benefit 2015 - 2018 (zoomed)

To see if the long-tailed property of the distribution is changing over time, we plot the same data split by financial year (in the graphs the year labels are for the year in which the financial year begins):

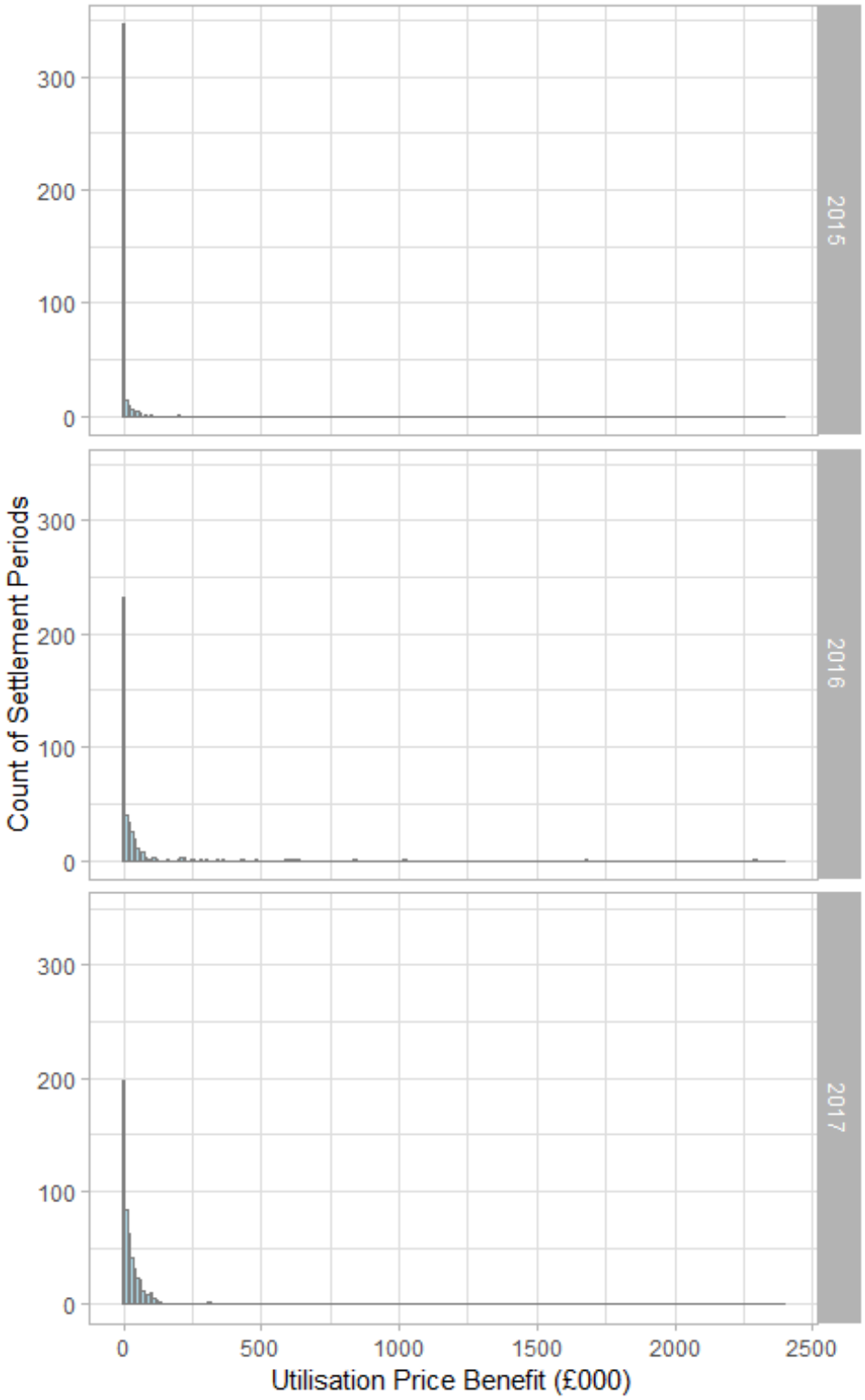


Figure: Utilisation Benefit by financial year

And the zoomed version:

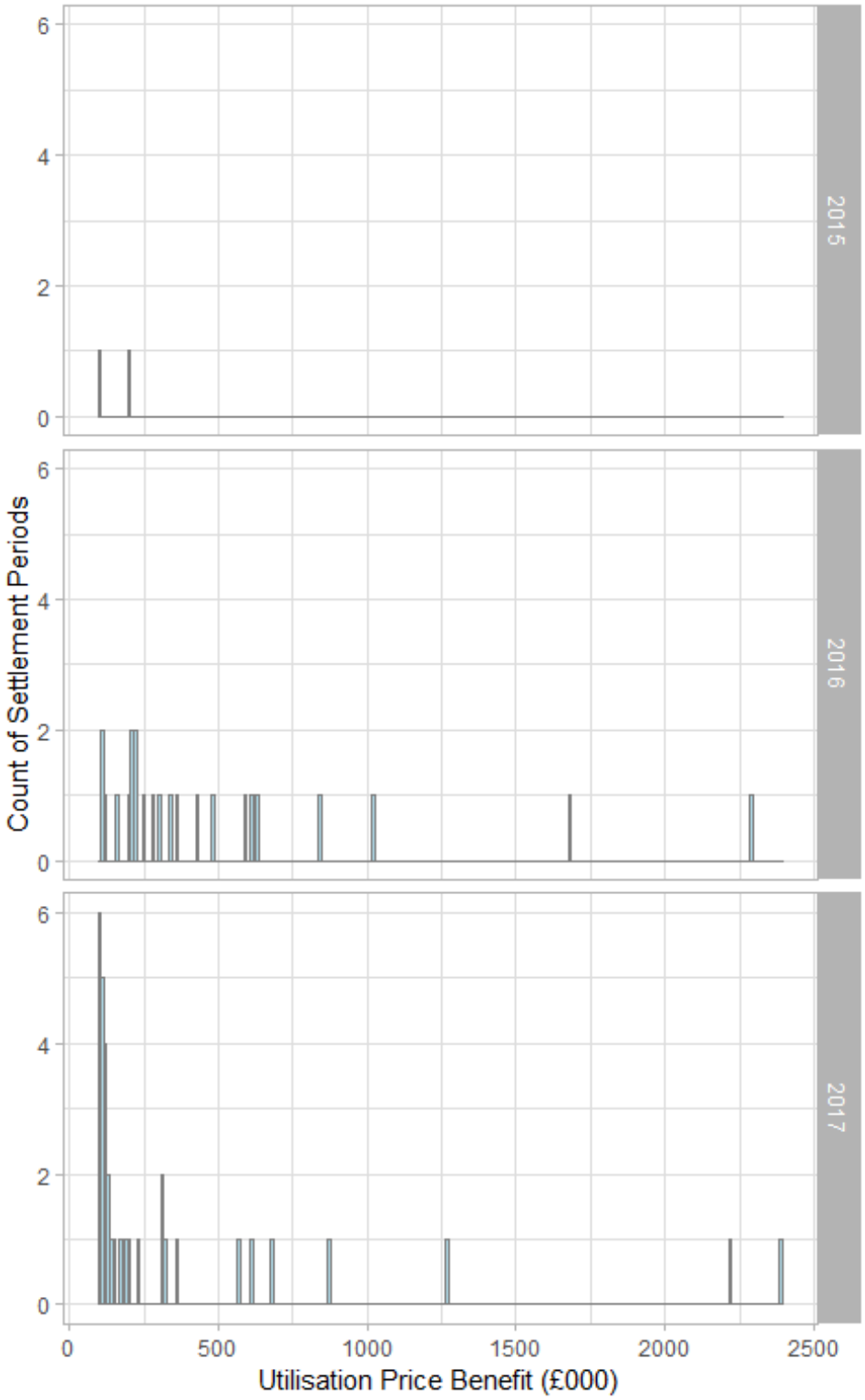


Figure: Utilisation Benefit by financial year (zoomed)

In financial year 2015-2016 the majority of utilisations of STOR have zero benefit from the utilisation price: they are indifferent as to whether a utilisation price is contracted. As we progress in time, the number of occasions on which we have zero benefit is sharply reducing.

This implies that recently consumers are obtaining more benefit from the use of utilisation prices.

The tails of the distribution are also becoming longer, as is particularly clear from the 'zoomed' versions of the graphs.

To illustrate this long-tailed phenomenon further, we look at the most recent financial year in the data set, 2017-18, and measure what percentage of utilisations contribute to the overall yearly benefit.

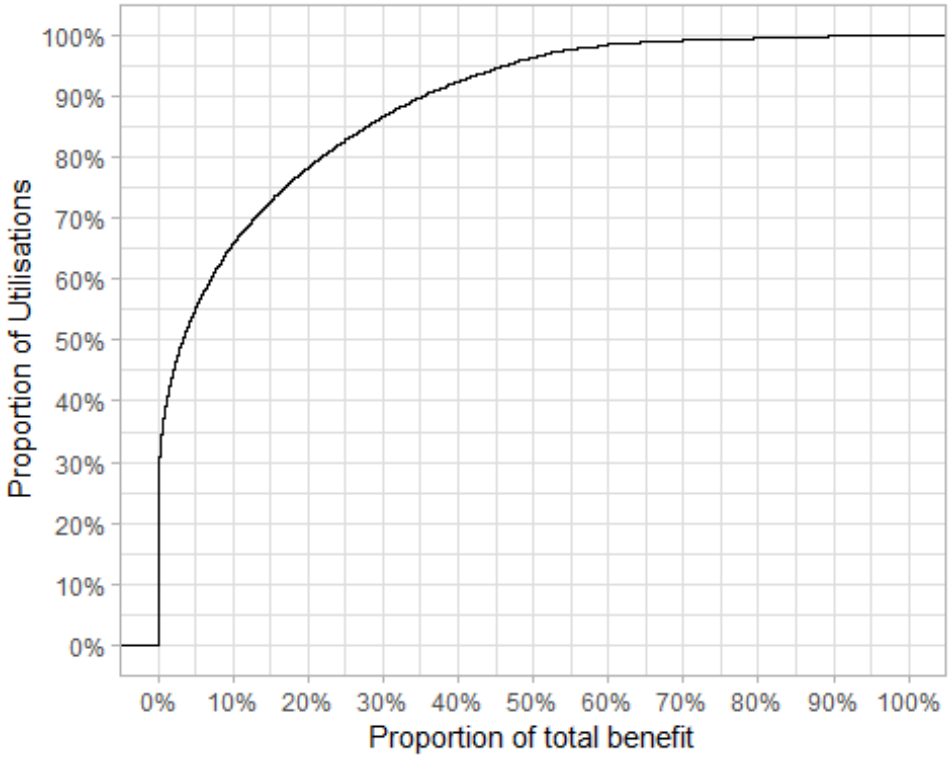


Figure: Cumulative distribution of Utilisation Benefit 2017-18

This shows the classical 20%/80% behaviour of the long-tailed Pareto distribution. 80% of all the benefit from having utilisation prices comes from 20% of the occasions on which STOR is utilised. And 50% of the benefit comes from just 4% of the utilisations.

This illustrates that the consumer benefit of utilisation pricing comes from the avoidance of the very high prices in the long tail of the imbalance price distribution.

Sensitivity of the Proxy Price model

As discussed earlier, the Proxy Price model does not allow for any negative benefit, as it has a floor at zero. Although there are good arguments for this property, including the strong analogy with a call option hedging strategy, we nonetheless demonstrate in this section that any error that might be present in the proxy price model is negligible compared to the overall benefit.

We analyse this in two parts.

First we consider the effect of assuming that the tendered auction utilisation price is a good measure of the marginal run cost for a unit. This is done by adapting the proxy price model to:

$$Proxy\ Price = \max(STOR\ Price - offset, Imbalance\ Price)$$

for different values of the offset. This measures the sensitivity of the model to the marginal run cost assumption by reducing the volume weighted price by an offset amount to reflect some possible (but in our view economically unrealistic) amount in £/MWh.

Secondly we consider the sensitivity to the imbalance price assumption. In this model sensitivity analysis we assume that STOR units which have not already been utilised in the BM misjudge the price they could obtain, which would typically be higher than the marginal BM Imbalance price because of scarcity pricing. Instead they set their price below

the imbalance price. In practice we would expect units to price themselves above the imbalance price (i.e with a negative offset). This is done by adapting the proxy price model to:

$$Proxy\ Price = \max(STOR\ Price,\ Imbalance\ Price - offset)$$

The graph shows the effect of these two sensitivities on the STOR benefit for the financial year 2017-18 of different values of the offset, with 0 representing the current ESO model. In plotting the data we have chosen to restrict the offset sensitivity to a maximum of £50/MWh. This would imply many STOR units effectively offering to run for free.

The model is more sensitive to the imbalance price insensitivity. However, in both cases the model still returns strongly positive benefits

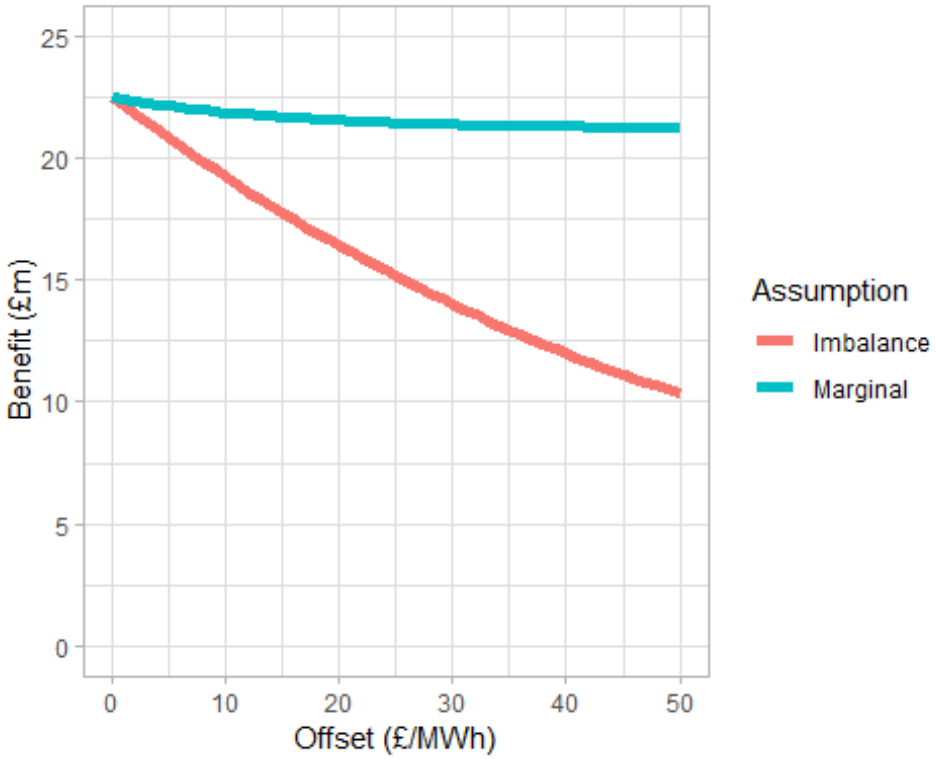


Figure: Sensitivity of Proxy Price model for 2017-18

This demonstrates our claim that the model is relatively insensitive to realistic errors arising from the Proxy Price model.

Supporting Analysis for FR

The expected change in utilisation price for Fast Reserve

Tendered Fast Reserve is a service that can quickly inject or withdraw active power when it is manually instructed. It is used as frequency regulation during periods of uncertainty such as demand pick-ups, interconnector and wind swings. The requirement for Fast Reserve is that a unit must be 25MW in size, with a ramp-up rate of 25MW per min and a response within 2 minutes of instruction from ENCC. All providers who have a Fast Reserve framework agreement can tender into the firm service or offer an optional service which is nominated by ENCC.

The Fast Reserve service is procured via monthly tenders, where we compare the forecasted contracted cost to estimated alternative costs the service would displace. This ensures efficient utilisation prices, but guards against very high offer prices being the only alternative in real time.

The Fast Reserve service can only be provided by a small set of providers – historically, this was the fleet of pumped storage stations (Dinorwig, Ffestinog and Cruachan). In recent years, this has been added to with non-BM and aggregated providers.

Proxy Price

There is no exact way to know what would have occurred if there had been no contracted utilisation prices in operation during the period 1 April 2016 to 31 March 2018. Market conditions would have set the price offered by FR units, and we cannot know with certainty what prices FR units would have offered.

However, there are some general principles that allow us to calculate a proxy price for the hypothetical offered price.

In the current FR tendering process potential FR providers submit an availability price and a utilisation price. The worst outcome for a successful unit is, after having been accepted for the contract, then not to be called when FR services are required because their utilisation price is too high. Therefore the ESO assessment procedure assumes that in the tendering process a FR unit will set its utilisation price at the marginal cost of running the unit, and all fixed costs and risk premiums will be included in the availability price. This implies that the utilisation price is a good measure of the marginal run cost for that unit.

Secondly, FR providers are providing a very scarce resource (more so than STOR). Only a small number of BM and non-BM units have the technical ability to provide energy on the very short time-scales required by the ESO Control Room when they instruct a FR unit. Hence FR units would be able to set a price in the BM above the marginal imbalance price and be confident that they would be taken out of the general merit order by virtue of their additional technical capabilities: this is effectively a scarcity rent.

This justifies the use of proxy price:

$$Proxy\ Price = \max(FR\ Price,\ \text{Minimum offer price of units which can provide service})$$

In the case of units that can provide the service, we are using the fleet of pumped storage sites: six units at Dinorwig, four at Festiniog, and four at Cruachan.

Analysis

We examined all settlement periods between 1 April 2016 and 31 March 2018 during which FR units were utilised. For each settlement period we calculated the volume weighted FR utilisation price and calculated the equivalent proxy price. The FR utilisation benefit was defined as the difference between proxy price and the volume weighted FR price.

For periods when the minimum offer price was less than or equal to the volume weighted FR price this implies the benefit was £0: this means that the price paid for the required FR units in those settlement periods would have been the same, regardless of whether there is a utilisation price or a market price.

In periods when the minimum offer price was greater than the volume weighted FR price this implies the benefit was positive, and the consumer is benefiting from the use of fixed utilisation prices.

The total benefit for the three financial years (labelled by the start of the financial year) is:

Year	Benefit (£k)

2016	0.4
2017	225.5
2018	605.5

Table: Yearly Benefit in £k

This shows that there is a small benefit the consumer is receiving from the use of utilisation pricing in FR contracts, but importantly that benefit is increasing. Certainly, there is no evidence to suggest that an alternative utilisation price would offer better more benefit to consumers.

The increase has been driven by the changing nature of participation in FR. The market is increasingly being opened to participations who are non-BM parties. This increase in market liquidity in a market with a small number of providers, is causing downward price pressure.

There is a positive benefit to consumers of the fixed utilisation price, over the market price. This implies that there is real customer benefit from retaining utilisation pricing in FR contracts, and justifies the A16.6 exemption.

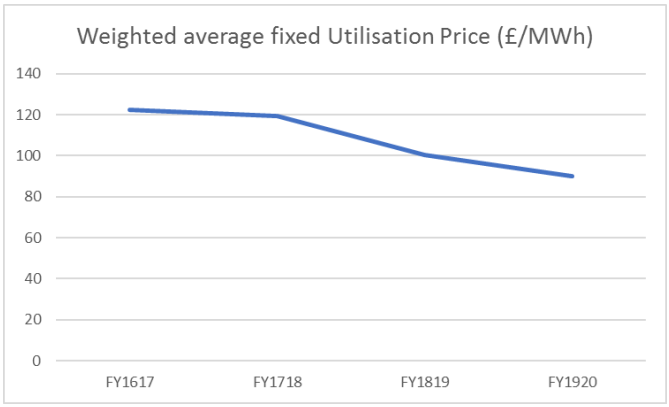


Figure: Downward trend in average Utilisation Price due to market pressures

Additional General Analysis

The ESO's expectations on the changes to the availability prices.

If the utilisation price were no longer fixed, then we would expect a change in the availability price to reflect this. However, it is difficult to predict exactly how providers would price their availability in a market with a different utilisation price, as this depends on their individual business model and their risk appetite. We will however, explore the issue from the perspective of economic theory

The proposal is to move from a product with a fixed ex ante utilisation price, to a product with a variable real-time utilisation price. In the context of these balancing service, the provider has very limited choice about whether to provide the balancing service if called. Under a variable utilisation price, the price they will achieve for the utilisation of their product is now unknown when the availability price is set. Economic theory suggests that this risk will need to be priced in to the (fixed) availability price offered to the market, and in this case an increase in the availability price.

However, if the utilisation price is expected to be on average higher than the fixed price, this would tend to put a downward pressure on the availability price. The total cost to the consumer is the sum of the availability and utilisation price, and how the market parties will response is not clear.

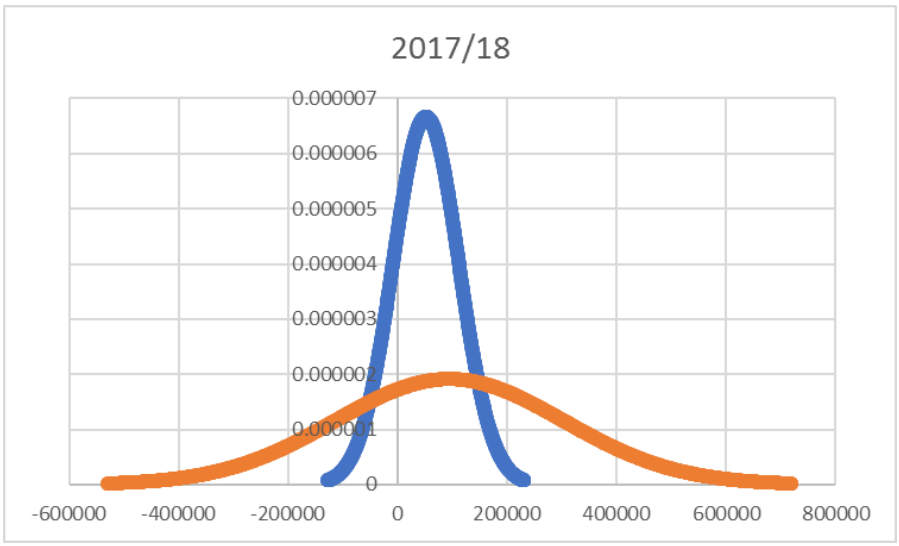
Under a variable utilisation price, market participants will need to determine their availability price through a new pricing strategy. If we assume today that providers operate in an economically rationale way, then we can assume that the fixed utilisation price plus the availability price is sufficient for the provider to make a normal profit.

To help guide how this strategy might work we have looked at previous STOR prices and previous market prices.

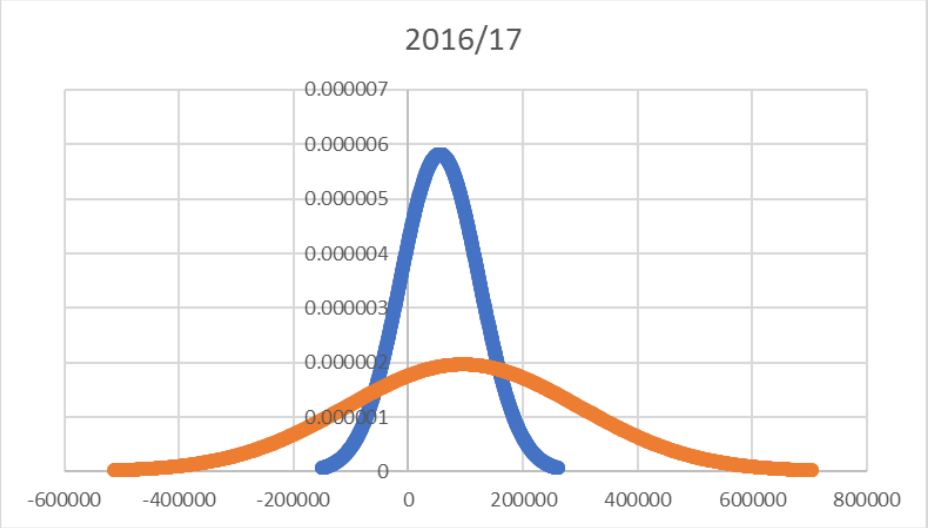
Analysis of historic STOR and market prices
We conducted analysis which looks at the price paid for utilised STOR volumes in comparison to costs that we could potentially be exposed to if we were to remove utilisation from contracts and allow providers to submit bids and offers closer to real time. We examined the historic dispatch instructions and their associated costs for the previous three years (2015/2016, 2016/2017, 2017/2018). The "Max" figures shown in the tables represents the highest cost paid for STOR instructions in a given period (morning or evening) during this year.

We then removed the prices associated with these instructions and replaced them with a proxy representing prices that we may have been exposed to if prices had not been agreed within the contracts. The proxy used was the maximum of the volume weighted average price of the actual STOR instructions or the imbalance price for the given period. These figures can be found in the "STOR Revised" column.

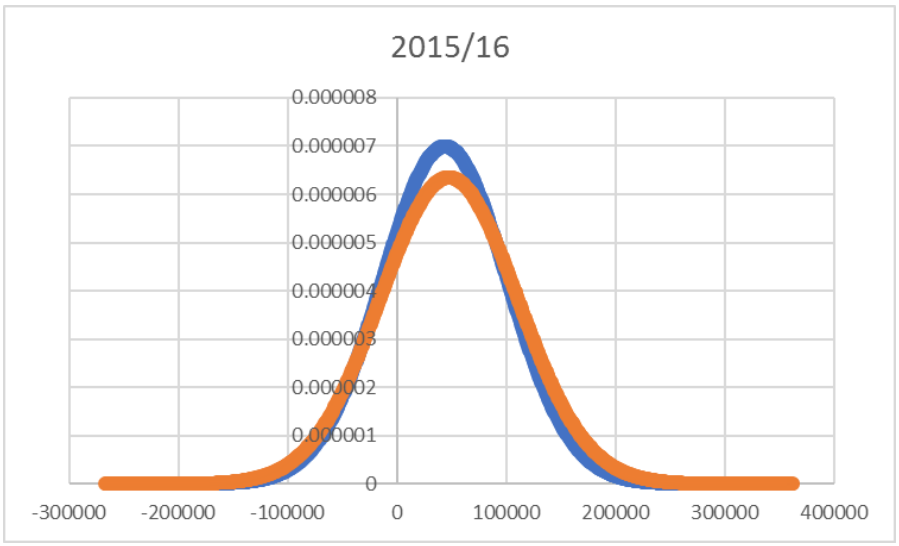
From the distribution curves, we can see that there is a much greater spread in the revised STOR prices (orange line) than in the actual STOR prices (blue line). This is because there are a significant number of periods where the proxy is greater due to the volatility of the imbalance price. This is true for all years except 2015/2016. In this case, large volumes of STOR were instructed and the imbalance price was below the instructed STOR price. This greater spread indicates that volatility in utilisation prices would be far greater if purchased closer to real time, meaning that the risk of being exposed to high prices is significantly greater. In the two most recent years, the maximum cost of STOR in a given period "revised STOR" would have been approximately 5 times greater than the maximum cost paid through contracted utilisation prices.



17/18	STOR Actual	STOR Revised
Q1	£14,855.06	£21,731.60
Median	£32,842.13	£50,850.20
Q3	£69,550.41	£107,517.89
Max	£623,627.49	£3,016,933.15

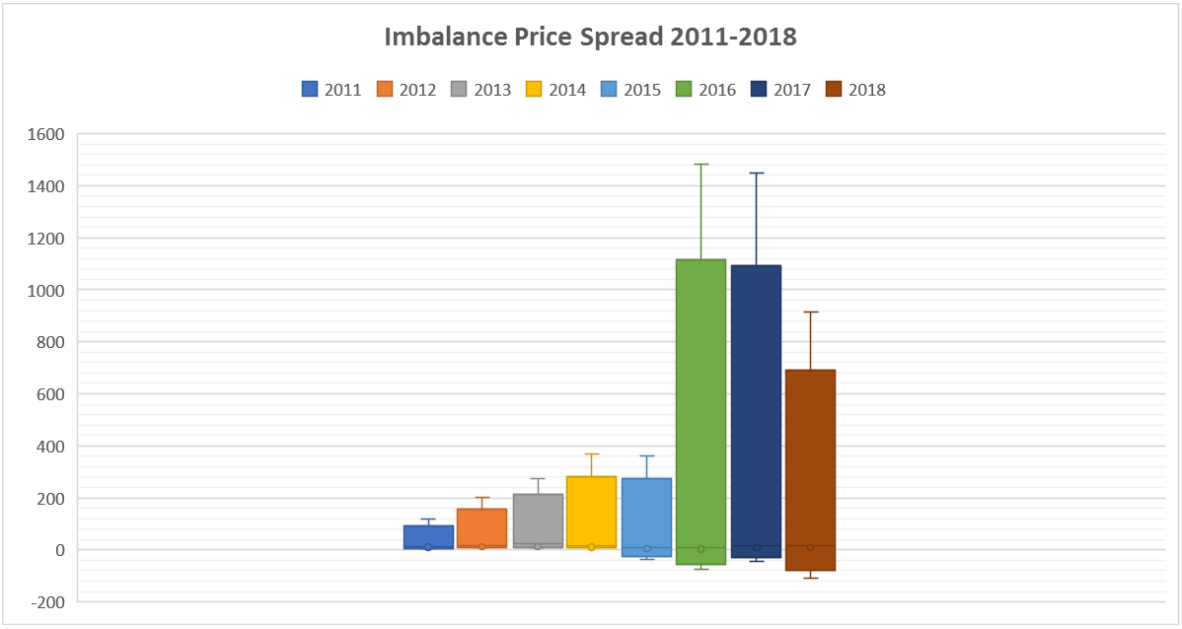


16/17	STOR Actual	STOR Revised
Q1	£13,888.22	£15,291.43
Median	£31,960.72	£45,217.12
Q3	£69,736.38	£94,814.65
Max	£450,241.80	£2,454,668.21



15/16	STOR Actual	STOR Revised
Q1	£10,075.00	£10,112.16
Median	£23,544.49	£25,085.13
Q3	£58,873.71	£60,403.29
Max	£497,289.41	£497,289.41

A more volatile imbalance price is likely to increase the risk associated with removing the fixed utilisation price. The graph below demonstrates that since 2016 we have seen a significant increase in the volatility of the imbalance price. This is further evidence that prices are becoming more unpredictable, and the value of agreeing prices in advance to mitigate some of this risk continues to be important.



The cost of the volatility in the utilisation price will need to be priced in to the availability element of the product. Although there is potential for significant upside to the provider, there is potential for significant downside, and therefore, parties will need to be aware of that when pricing their availability price. The volatility in the market and

imbalance price, means that it is difficult to ascertain if there will be an economic benefits from moving to a variable utilisation price, when considering the availability price.

An analysis of alternatives available to the ESO in real time

In real time the ESO uses a suite of tools to balance the system in real-time. Our primary tool is the balancing mechanism where we take bids and offers in merit order to meet the technical needs on the system. In addition, where economic against the balancing mechanism we procure ancillary services including STOR and FR. As part of the assessment of these services we compare the tender cost against what would be available in the balancing mechanism. This allows us to lock in the efficient utilisation prices available ahead of time to meet our reserve requirements. In operating timescales, we will then use the most economic option to access these services, either the contracted utilisation price or the balancing mechanism.

The combination of the balancing mechanism and the fixed utilisation price allow us to always take the most efficient decision for consumers. If the fixed utilisation price is higher than the market price, then we would take a cheaper product from the balancing mechanism. If the fixed utilisation price is lower than the market price, then we would take the cheaper fixed price. In both cases the cost is the lower of the market price or the fixed price.

In this sense, the back-up of the balancing mechanism ensures that we access products in the most efficient market. The fixed price allows us to benchmark the balancing mechanism and allows us to never pay *more* than the fixed price.

Without a fixed utilisation price, we would be exposed to both sides of the market price, therefore being exposed rather than protected against high market prices. Our analysis suggests that these are also becoming more frequent and of higher cost.

Moreover, the balancing mechanism does not however ensure availability and we as the ESO require certain types of products in order for to secure and manage the system in real-time.

A clear articulation of how all the factors considered lead to higher economic efficiency in GB.

In summary:

- **Utilisation prices will on average be higher with a variable product.** Providers who already provide their availability and utilisation price that is required to allow them to make a normal profit, so the fixed price can be considered a floor price. A variable utilisation price allows the provider to make additional revenue over what is needed for their normal profit, including the need to price in risk for uncertainty. We have demonstrated that for both STOR and FR, there is positive consumer benefit in the fixed utilisation price.
- **The impact on availability prices is difficult to assess.** The move to a variable price will introduce risk, which *ceteris paribus* will increase availability prices. The market-price is significant more volatile and increasing so, compared to the STOR price for example hence the expectation that available payment may increase. However, given the potential for significant higher utilisation payments some providers may price their availability payment down to enable them to secure the higher utilisation payment. The precise route a provider will take is determined by their own risk portfolio.
- Other mechanisms are available to the ESO, and the combination of the balancing mechanism and the fixed price ensure we **do not pay more than the fixed price**, with the fixed utilisation prices effectively operating as an option price.

NGESO strongly believe that an exemption to Article 16.6 of the EBGL is the most economically efficient option for the GB market and end consumer. With difficult and uncertain market conditions in light of the Capacity Market suspension, as well as increasing risk of volatile balancing costs, pre-contracted prices allow some degree of certainty in both cost and liquidity. We are committed to reforming our Reserve markets and propose that the implementation of closer to real-time procurement (and therefore removal of prices from long-term contracts) is re-visited as part of this work.