UNC Modification	At what stage is this document in the process?
# UNC 0716A: ## Revision of Overrun Charge Multiplier	01 Modification 02 Workgroup Report 03 Draft Modification Report 04 Final Modification Report

Purpose of Modification:

This Modification Proposal seeks to amend the multiplier in the Overrun Charge calculation at NTS Entry and Exit Points

	The Proposer recommends that this modification should be: • Treated as an Alternative to Modification 0716 and should proceed as such under the same timetable as Modification 0716 .
	High Impact: None identified
	Medium Impact All parties that pay NTS Transportation Charges and/or have a connection to the NTS, and National Grid NTS
	Low Impact: None identified

Contents

Timetable

The Proposer recommends the following timetable:

Pre-modification presented to WG	02 April 2020
Presented to Panel for determination on Alternative status	16 April 2020
Workgroup Report presented to Panel	21 May 2020
Draft Modification Report issued for consultation	22 May 2020
Consultation Close-out for representations	11 June 2020
Final Modification Report available for Panel	12 June 2020
Modification Panel decision	18 June 2020

Any questions?

Contact:
Joint Office of Gas Transporters

enquiries@gasgovernance.co.uk

0121 288 2107

Proposer:
Benoit Enault, Storengy UK Limited

benoit.enault@storengy.co.uk

07741 311950

Transporter:
National Grid

Anna.Stankiewicz@nationalgrid.com

07866 884818

Systems Provider:
Xoserve

UKLink@xoserve.com

Other:
Nick Wye

nick@waterswye.co.uk

07900 055144

1 Summary

What

Overrun Charges are intended to incentivise Users to book capacity to match anticipated flows, while not being overly penal as to lead to excessive over-booking of capacity and not encumbering Users with disproportionate costs.

At Entry Points, Overrun Charges are applied to any one User where that User's flows exceed their capacity holdings. At Exit Points, Overrun Charges are applied to an equivalent volume of flow, where the aggregate flow exceeds aggregate capacity holdings.

This proposal seeks to amend the multiplier (eight) used in the determination of Overrun Charges at Entry and Exit Points

Why

The NTS Capacity Access Review initiated through Modification 0705R is intended to establish a long-term strategy for the NTS capacity access regime. The Review separated out short-term problems from long-term ambitions, with overrun charges being identified as a short-term problem worthy of immediate attention. The driver behind its classification was a combination of the expected change to the NTS charging regime in October 2020, following the anticipated implementation of Modification 0678A, but also the fact that overrun multipliers had not been reviewed since their inception, over 20 years ago. In summary, the review of overrun multipliers was intended to consider whether they had been set at levels which were appropriate historically and for the future.

To this end, the Proposer has developed a set of Principles which it recommends are adhered to when assessing the validity of the current Overrun Multipliers as well as providing an "acid test" against which any changes to them should be measured.

Furthermore, the industry felt that with bookings potentially being made closer to flows in the future, it is anticipated that more accurate FCC's (Forecasted Contracted Capacity) should be produced. High Overrun Charges work against this by encouraging Users to book more capacity than they require (for the fear of over-running and incurring exceptionally high penalties).

The analysis carried out by the Proposer concludes that the current multipliers are inconsistent with the Principles.

How

The Proposer has carried out analysis to examine recent patterns in User NTS Capacity bookings. The results show that while short-term products remain plentiful and broadly zero-priced, Users have engaged in a strategy of over-booking capacity when compared to anticipated flows. DNs are an exception to this rule, as they are subject to specific Licence Conditions to meet peak demand levels on their networks,

On the basis that there is no commercial or strategic advantage to be gained through capacity overruns, given the extremely penal nature of the charges, it is reasonable to conclude that historical overruns are the result of User error.

With the expected implementation of Modification 0678A in the short-term, it is anticipated that Users will modify capacity booking strategies and place greater emphasis on minimising capacity costs by purchasing short term capacity products to match flows. This shift in booking behaviour will reduce the "margin for error" and likely result in a greater number of overrun events in future.

The Proposer identified three key conclusions from its analysis:

Conclusion 1: Users have made little attempt to match capacity bookings with anticipated flows, and instead bulk buy surplus capacity at zero or significantly lower costs to safely satisfy their daily needs and avoid overruns.

Conclusion 2: The predictable change in booking behaviour as a result of a change to the Charging Methodology focused on capacity-based charging, with limited or no discounts for short-term capacity products, renders historical booking bahaviours irrelevant to informing future booking behaviours.

Conclusion 3: There is no commerical or strategic advantage to be obtained from capacity overruns with extreme penalties, therefore, it must be concluded that such events are a result of User error.

In light of these findings and with the intention of adhering to the Principles outlined in the Modification, it is propoesed that the Overrun Mutliplier its reduced to 1.1. This level of Overrun Multiplier is consistent with the multiplier already established in the UNC on the occasion that National Grid takes a Constraint Management Action.

2 Governance

Justification for Alternative Status and Authority Direction

The Modification addresses the same issues that have been raised under Modification 0716 but offers an improved solution by setting Overrun Multipliers at levels better aligned with the core principles of overrun charges than those proposed under Modification 0716.

As the proposal contains features common to Modification 0716 the Proposer believes that this Modification should be deemed to be Alternative to Modification 0716.

As with Modification 0716, the proposal has a material cost impact on the transportation arrangements for Shippers and relevant consumers and should be subject to Authority Direction

Requested Next Steps

This modification should:

be deemed to be Alternative to Modification 0716, and as such should

- be considered a material change and not subject to self-governance
- be subject to the same timetable as Modification 0716

3 Why Change?

The NTS Capacity Access Review initiated through Modification 0705R is intended to establish a long-term strategy for the NTS capacity access regime. The Review separated out short-term problems from long-term

ambitions, with overrun charges being identified as a short-term problem worthy of immediate attention. The driver behind its classification was a combination of the expected change to the NTS charging regime in October 2020, following the anticipated implementation of Modification 0678A, but also the fact that overrun multipliers had not been reviewed since their inception, over 20 years ago. In summary, the review of overrun multipliers was intended to consider whether they had been set at levels which were appropriate historically and for the future.

This proposal looks to build on evidence from the recent past, as a basis for assessing the effectiveness of the current overrun multipliers, as well as look to the changing landscape going forward. In the very short-term, the anticipated implementation of Modification 0678A will mean that the shift towards capacity-based charges, coupled with the removal of, or significant reduction in discounts for short term capacity products, will inflate the price of capacity and alter the way in which Users acquire it. Users will endeavour to reduce overall capacity costs from over-booking through profiling capacity purchases to better reflect flows meaning that the risk of accidental overrun is likely to increase accordingly.

Without a reduction in multipliers in the short-term, Users will face increases in overrun penalties, in absolute terms, as well as skew capacity purchasing behaviours to the detriment of all Users, National Grid NTS and consumers.

4 Code Specific Matters

Reference Documents

Uniform Network Code Section B

Knowledge/Skills

An understanding of the NTS Capacity Overrun regime

5 Solution

Purpose of overrun multipliers

Overrun multipliers have formed part of the UNC since market opening in 1996. They were established to provide an incentive on Users to purchase sufficient volumes of capacity, at both NTS Entry and NTS Exit Points, to satisfy expected supplies/demand. A multiplier of 8 was introduced primarily, as it was proposed at the time, as being representative of a reasonable incentive, however, there is no suggestion that this was settled upon as a result of any meaningful analysis. It should also be recognised that at the time the overrun multiplier of 8 was set, the GB gas market was in a period of growth (during the “dash for gas”); capacity was invariably constrained in some locations; and the NTS was expanding to accommodate market demand. Therefore, at that time, a higher incentive and penalty may have been more justified.

While other incentives, such as balancing, have been changed to reflect the changes in the gas market, overrun multipliers have been retained at their original levels without being subject to review. The solution put forward in this modification, endeavours to assess the effectiveness of the current overrun multiplier as well as investigate how the changes in the gas market, both physically and commercially might be reflected upon in the derivation of future overrun multipliers.

Principles underpinning overrun multipliers

In order to determine what would constitute an appropriate multiplier, a set of base principles should be established.

Proposer's recommended base principles;

1. Any incentive should be set at a level to encourage capacity bookings that are more reflective of "need"
    a. Overbooking to insure against overrun will create false scarcity and potentially mislead NGG where capacity bookings are used as an indication of flow
    b. Where capacity reserve prices are set as a basis for recovering revenue. excess bookings will increase TO revenue which in turn will require balancing via k factor or Revenue Recovery Charge. This creates uncertainty and unpredictability in capacity costs for Users and end consumers and runs contrary to the objectives which underpinned the NTS Charging Review
2. Overrun charges should not be dis-proportionate
    a. Provide an incentive to book required capacity, but not be unduly penal. Revenues raised from overruns are allocated to shippers via capacity neutrality, resulting in a windfall benefit as a result of shipper error, where shipper error is the cause of an overrun
    b. When the network (the NTS) is "unconstrained", meaning there is generally surplus of capacity, the provision of additional "unbooked" capacity via overruns is at no cost to NGG and does not disadvantage or undermine the market
    c. Where the NTS is constrained, overruns could be priced at levels greater than the default multiplier (currently 8) multiplied by the auction price. The alternative overrun charges will better reflect the cost of managing the NTS during a constraint.

Capacity booking behaviour in the recent past

An examination of booking patterns over the last 12 months provides a useful indicator of User booking behaviour in respect of the current capacity charging regime. Section 11 of this Modification provides a summary of the analysis carried out by the Proposer to support the observations and conclusions set out below.

During this period, NTS capacity has been broadly unconstrained, with Users able to access relatively cheap, or even free Entry Capacity. At exit, competition for capacity is generally restricted as at most Exit Points the Exit Capacity is provided to support an individual offtake. Further to this, on the Exit side at NTS/DN interconnections, DNs are subject to regulatory obligations to meet peak levels of network demand, meaning that commercial drivers to minimise Exit capacity costs are greatly diminished. For shippers, where they are required to acquire Exit capacity, the ability to pass on these charges to customers is more prevalent, when compared to entry charges, which again diminishes the incentive to actively manage and minimise associated costs.

Booking behaviour at Entry Points

Entry Capacity can be acquired directly from National Grid via a series of term auctions, ranging from quarterly firm to within day interruptible. For capacity bought ahead of the day a positive reserve price is set, while for within day products (firm and interruptible) the reserve price is zero. To understand how the unconstrained properties of the NTS combined with the variance in reserve prices impacts User booking behaviour, the Proposer has elected to investigate two Entry Points, Bacton UKCS and St Fergus. Based on our wider

examination of Entry Capacity booking behaviour these Entry Points provide a good benchmark, reflecting similar behaviours to other Entry Points.[1]

The results of the analysis (Section 11, part 1) clearly show a strong demand for short-term capacity products, both within day firm and interruptible, which reflects the confidence in the market that capacity is plentiful with negligible probability of not being made available, allowing it to be acquired at zero, or close to zero cost. Further, as all of the short-term capacity made available is acquired, usually in excess of actual flows, it is reasonable to assume that Users make little attempt to match capacity bookings with anticipated flows, rather bulk buying surplus capacity at zero cost to more than satisfy their daily needs.

Booking behaviour at Exit Points

Exit capacity can be acquired directly from National Grid via a series of term auctions, ranging from annual firm to off-peak capacity. For firm capacity a positive reserve price is set, while for the off-peak product the reserve price is zero.

The booking of Exit Capacity varies depending on the nature of the offtake, with varying emphases placed on managing costs versus ensuring capacity is acquired, as described above.

To understand how the unconstrained status of the NTS combined with the variance in reserve prices impacts User booking behaviour, the Proposer has elected to investigate three Entry Points, Stublach (storage), Rocksavage (power station) and Bacton IUK (interconnector). The Proposer elected not to investigate NTS/DN Exit Points as capacity booking is dictated by licence requirements.

The Proposer believes that the data from the three Exit Points (Section 11, part 2) provides a good indicator of User booking where there is a commerical incentive to minimise costs.

As with Entry Capacity, at the three Exit Points examined, there has been a high level of demand for off-peak capacity, with avaialble capacity often sold out. Again, it is reasonable to assume that as the product can be acquired at zero cost, Users make little attempt to match capacity bookings with anticipated flows, again over-booking capacity to more than meet their needs.

Conclusion 1: Users have made little attempt to match capacity bookings with anticipated flows, and instead bulk buy surplus capacity at zero or significantly lower cost to safely satisfy their daily needs and avoid overruns

Impact of anticipated changes to the NTS Charging Methodology

In order to comply with the EU Tariff Code, Modification 0678 (and alternatives) were developed by industry and are currently under consideration by Ofgem. The Modifications all propose a move torwards capacity-based NTS charges and a change to the underlying charging methodology, replacing the current LRMC approach with either Postage Stamp or Capacity Weighted Distance methodologies. In its minded to decision[2] Ofgem has stated a preference for Modification 0678A which proposes a Postage Stamp methdology. Further,

[1] Those Entry Points which acquired significant volumes of QSEC capacity in order to fulfil incremental investment User commitment obligations show moderately different results.

[2] https://www.ofgem.gov.uk/publications-and-updates/amendments-gas-transmission-charging-regime-minded-decision-and-draft-impact-assessment

it includes: the removal of discounts for firm capacity products; a 10% discount for interruptible products and the replacement of TO Commodity Charges with Revenue Recovery Charges.

On the basis that Modification 0678A is implemented by Ofgem, this will change the reserve prices for all capacity products at all NTS Entry and Exit Points.

The analysis in Section 11, parts 3 and 4, shows that, on average and in absolute terms, reserve prices for NTS Entry Capacity and NTS Exit Capacity will be 76 times and 57 times higher, respectively, as a result of Modification 0678A. Clearly, given the current significant reliance on short-term, zero-priced capacity products as highlighed above, it is reasonable to expect Users' capacity booking strategies to evolve, with an empahsis being placed on minimising capacity costs. This will require that Users move away from "bulk buying" excess volumes of zero-price capacity to more pro-active, profiling of short-term capacity products to closely match anticipated flows. It is also likely that Users will defer booking until as late as possible as end of day flow information becomes more reliable.

Conclusion 2: This predictable change in booking behaviour as a result of a change to the Charging Methodology focused on capacity-based charging, with limited or no discounts for short-term capacity products, renders historical booking bahaviours irrelevant for informing future booking behaviours.

Why overrun?

Accepting the conclusion made above regarding booking behaviours this can be extended to the treatment of overrun multipliers.

Data provided by National Grid at the March 2020 Modification 0716 workgroup meeting[3] summarised overrun incidents during 2017/18 and 2018/19. Although the data is useful in order to understand the magnitude and dispersion of the overrun charges, no attempt was made to investigate the underlying reasons as to why the overruns occurred.

The Proposer recommends that based on our analysis, the relatively "hands off" approach to capacity booking observed by Users, as shown by the preference for short-term, zero-cost capacity products, coupled with the extremely penal cost associated with incurring overrun penalties (multiplier of 8) that the primary, if not sole reason for overruns is User error. It is evident that there is no commercial or strategic advantage to overrun, as the cost of doing so will be subsumed entirely by the User and undermine the tradeable value of the gas commodity. This assertion is reinforced by the observation that overruns appear to have been spread across multiple System Points and multiple Users, rather than any trend to consistently overrun at certain points

Conclusion 3: There is no commerical or strategic advantage to be obtained from capacity overruns with extreme penalties, therefore, it must be concluded that such events are a result of User error.

Setting the overrun multiplier

In order to understand the impact of overrun multipliers, the Proposer has compared the costs of applying a multiplier of 8, using current firm reserve prices, with the multipliers of 3 and 6 at NTS Entry and Exit Points respectively, using forecast October 2020 Postage Stamp reserve prices. The full results are shown in Section 11, parts 5 and 6.

[3] https://gasgov-mst-files.s3.eu-west-1.amazonaws.com/s3fs-public/ggf/book/2020-03/Mod%200716%20Tx%20WG%20050320_0.pdf?BSR7TUILgNTN4HZ6w68FEsayotIzYG24=

On average, in absolute terms, at entry, overrun costs would increase by a multiple of 28 and at exit by a multiple of 43. In both cases, the impacts are wide-ranging with at entry, multiples ranging from 0.3 to 80 and at exit between 0.23 and 129, however, it should be noted that in all cases this equates to an effective uplift in the price of capacity by 0.1287 p/kwh, (0.06345 p/kwh for storage) at entry and 0.1032 p/kwh, (0.0516 p/kwh at storage.[4] With gas trading at around 1p kwh for Gas Year 2020/21, these levels of overrun charges remain extraordinarily penal and any commercial motivation to overrun is not evident.

In determining an appropriate level for an overrun multiplier, in parallel with fulfilling the Relevant Objectives, it should:

- be consistent with the Principles set out in the Modification;
- only use historical evidence where it is valid to do so;
- be forward looking, reflecting the outlook for the UK gas market and accommodate any anticipated regulatory/contractual changes;

In respect of the above, it is proposed that the overrun multiplier is reduced from 8 set to 1.1.

This represents a 10% uplift to capacity charges, translating to 0.00429 p/kwh (0.00215 p/kwh at storage) for entry and 0.00172 p/kwh (0.00086 p/kwh at storage).

A mulitplier of 1.1 is consistent with the level applied where National Grid has taken Constraint Management Actions at either entry or exit.

6 Impacts & Other Considerations

Does this modification impact a Significant Code Review (SCR) or other significant industry change projects, if so, how?

No

Consumer Impacts

Improved safety and liability. Accurate capacity booking information supports the efficient and safe commercial operation and management of the system. In the current regime, capacity is not booked in any meaningful way, with Users booking excessive volumes of Entry and Exit Capacity, primarily on a short-term basis, as it is zero-priced and plentiful. Current overruns can only be explained as a result of User error, as commercially Users will always incur financial penalties for over-running. Where the charging regime favours capacity-based charges, a commercial incentive will endure, resulting in Users placing a greater emphasis on capacity booking strategies and processes. Reducing the multiplier to a level which balances an incentive to book without unfairly penalising User error will result in Users booking capacity representative of actual need, providing valuable information for the purposes of system operation. Where multipliers are too high, Users will tend to overbook capacity, degrading the value of capacity booking information in respect of system operation.

Lower bills than would otherwise be the case. The reduction in the multiplier will reduce User exposure to increased charges as a result of a change to the charging methodology, while also removing disproportionate penalties as a result of User error. Overrun charges are unlikely to be passed directly through to consumers,

[4] Were the multiples derived on the basis of interruptible, off-peak reserve or entry within-day firm prices they would be infinite.

however, consumer bills will directly be reduced by the resultant profiling of capacity booking by Users to more closely match anticipated flows. Were the overrun multiplier set at a higher level, Users are likely to "overbook" capacity, to mitigate against overly penal overrun risk, and pass the additional capacity costs directly onto consumers

Reduce environmental impacts Reduced Overrun Charges will help facilitate the new technology and new sources of gas, by eradicating penal charges, caused by User Error and ensuring excess volumes of capacity need not be purchased to mitigate against the risk of incurring excessive charges.

Cross Code Impacts

None

EU Code Impacts

None

Central Systems Impacts

None

7 Relevant Objectives

Impact of the modification on the Relevant Objectives:

Relevant Objective	Identified impact
a) Efficient and economic operation of the pipe-line system.	Positive
b) Coordinated, efficient and economic operation of (i) the combined pipe-line system, and/ or (ii) the pipe-line system of one or more other relevant gas transporters.	None
c) Efficient discharge of the licensee's obligations.	None
d) Securing of effective competition: (i) between relevant shippers; (ii) between relevant suppliers; and/or (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant shippers.	Positive
e) Provision of reasonable economic incentives for relevant suppliers to secure that the domestic customer supply security standards… are satisfied as respects the availability of gas to their domestic customers.	None
f) Promotion of efficiency in the implementation and administration of the Code.	None
g) Compliance with the Regulation and any relevant legally binding decisions of the European Commission and/or the Agency for the Co-operation of Energy Regulators.	None

Incentivising Users to book capacity reflecting their flows and not overbook capacity for fear of incurring excessively penal Overrun Charges will enable National Grid NTS to commercially plan, operate and mange the NTS accordingly thereby facilitating the efficient and economic operation of the system. Furthermore, ensuring the Overrun Charge is proportionate, will ensure that use of the unconstrained network is optimised and capacity is not sterilised, by risk-management motivated overbooking.

The expected changes to the NTS charging methodology, in order to comply with the EU Tariff Code will place a greater emphasis on capacity charges as a vehicle for collecting Transmission Operator allowed revenue. Users will give increased prominence to capacity booking, continuing to focus on short term products, but profiling purchases to more closely match flows, thereby reducing costs. In practice, Users will have an incentive to delay capacity booking until as late as possible within day, as end of day flow volumes become clearer. The changes in booking behaviour will exacerbate the potential for User errors, as surplus holdings will no longer be retained. A reduction in the multiplier to properly balance an incentive to book capacity, while discouraging excessive overbooking with a "penalty" which reflects the unconstrained status of the NTS will ensure costs are more effectively generated and allocated to the Users of the NTS. This will better facilitate effective competition between all Users of the network.

Furthermore, a multiplier which does not reflect the changing nature of the capacity regime, both in terms of the level of charges and subsequent User booking behaviour will unfairly penalise Users for errors and create a barrier to entry to new market entrants.

8 Implementation

This modification is raised as an Alternative to Modification 0716. It has been raised to properly reflect the objective of Modification 0705R "Capacity Access Review" to review the performance of the current Overrun regime and set appropriate Overrun Multipliers to reflect short-term changes to the charging regime, as a result of the anticipated implementation of Modification 0678A, while also be "fit for purpose" over the longer term.

This proposal should be considered for implementation on concurrent timescales with the implementation of Modification 0678A.

.

9 Legal Text

TBC

10 Recommendations

Proposer's Recommendation to Panel

Panel is asked to:

Agree that this Modification is an Alternative to Modification 0716 and should proceed on the same timetable

11 Supporting Analysis

Part 1. Entry Capacity booking behaviour

Bacton UKCS

Figure 1 shows the pattern of short-term capacity booked (within day firm and interruptible) over the period 1 April 2019 to 1 April 2020. It can be seen that the volumes of short-term capacity acquired during this period were close to, or exceeded the total monthly release obligated volumes, and on the majority of days exceeded flows.

Figure 1 Bacton UKCS short-term entry capacity bookings (Apr19-Apr20)

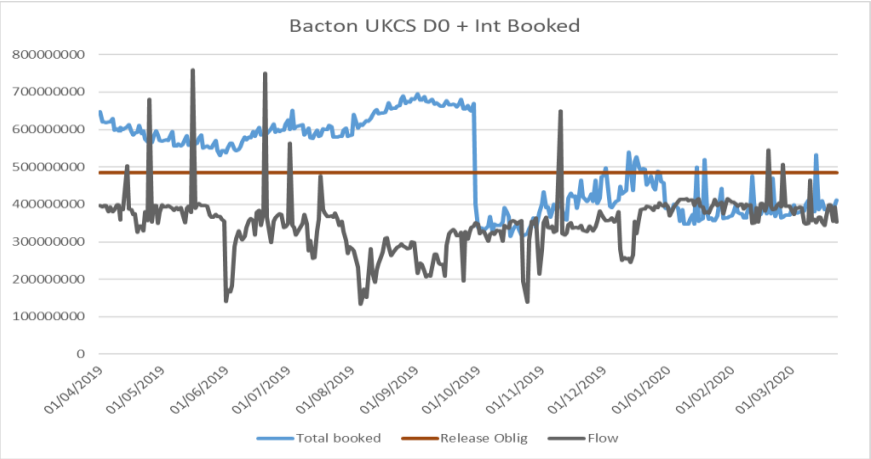
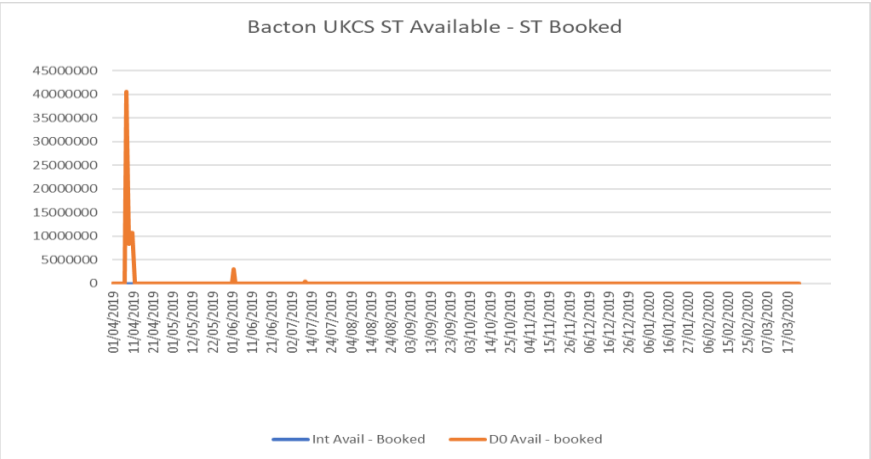


Figure 2 shows the the volume of within day firm and interruptible capacity bought compared to the volumes made avaiable. It can be observed that on nearly every day all capacity made avaialble on a short-term basis was booked by Users.

Figure 2 Bacton UKCS short-term capacity bookings v capacity made available



St Fergus

Figure 3 shows the same information as figure 1. The results at St Fergus are similar to Bacton, with significant volumes of short-term capacity acquired, exceeding flows throughoput the period.

Figure 3 St Fergus short-term entry capacity bookings (Apr19-Apr20)

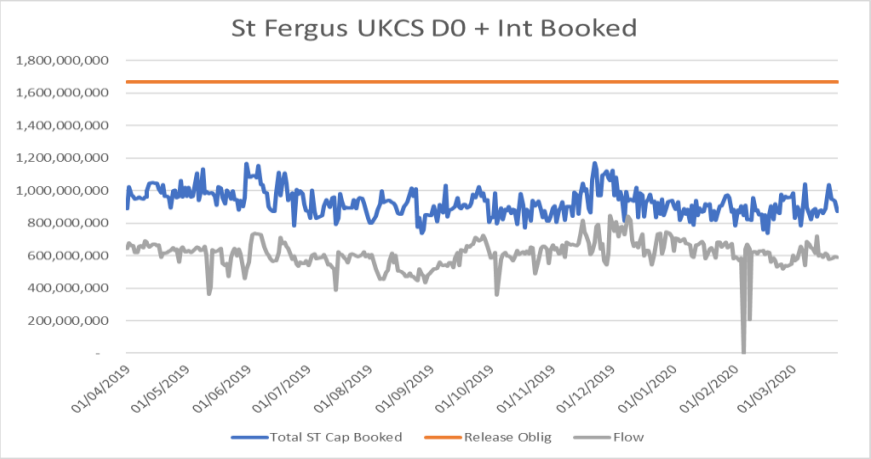
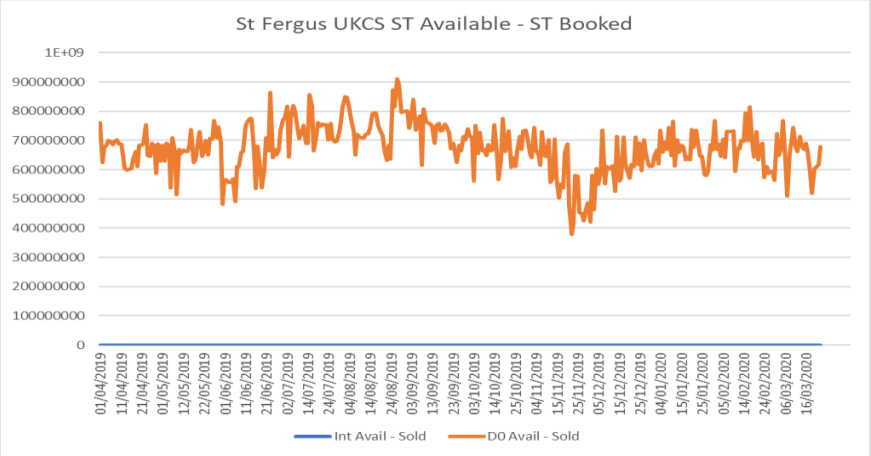


Figure 4 shows the the volume of within day firm and interruptible capacity bought compared to the volumes made avaiable. The results are a little different to Bacton, with less bookings of within day firm, compared to available capacity, however, all interrtuptible capacity made available was booked.

Figure 4 St Fergus short-term capacity bookings v capacity made available

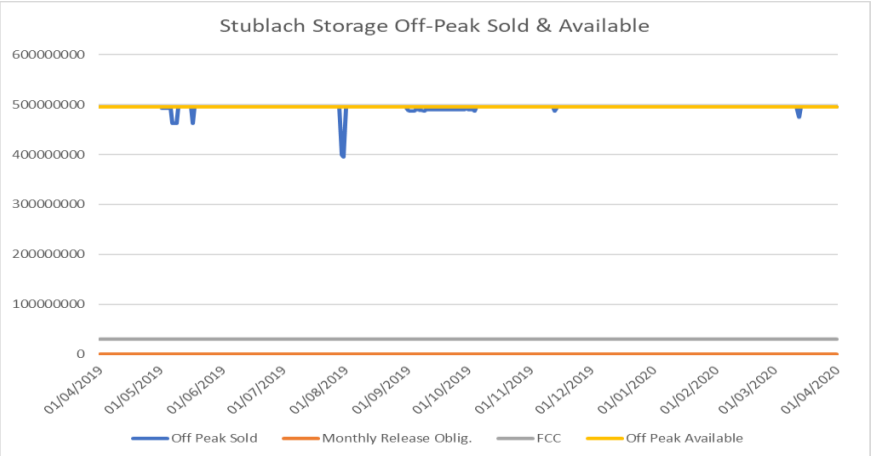


Part 2. Exit Capacity booking behaviour

Stublach (storage)

Figure 5 shows the pattern of off-peak capacity booked over the period 1 April 2019 to 1 April 2020. The maximum volumes of available off-peak capacity were acquired almost every day.

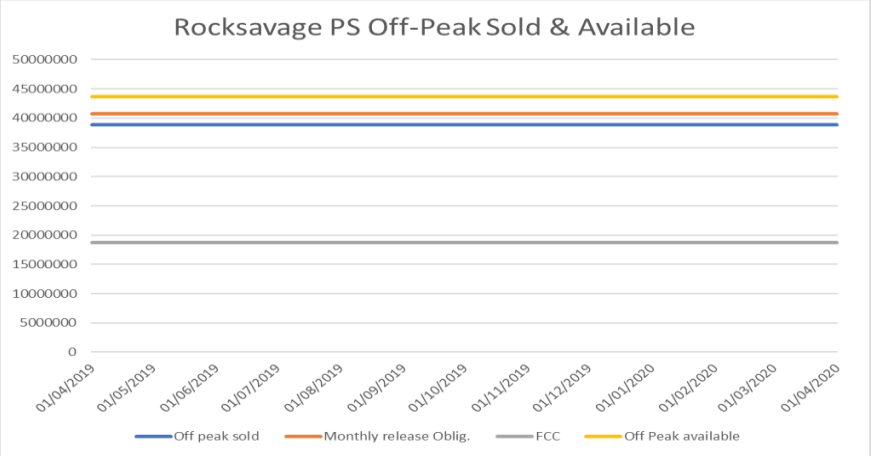
Figure 5 Stublach, Off-peak capacity bookings



Rocksavage (power station)

Similar patterns off-peak bookings occurred at Rocksavage, as shown in figure 6, with sales of of-peak caapcity being close to available volumes throughout the period

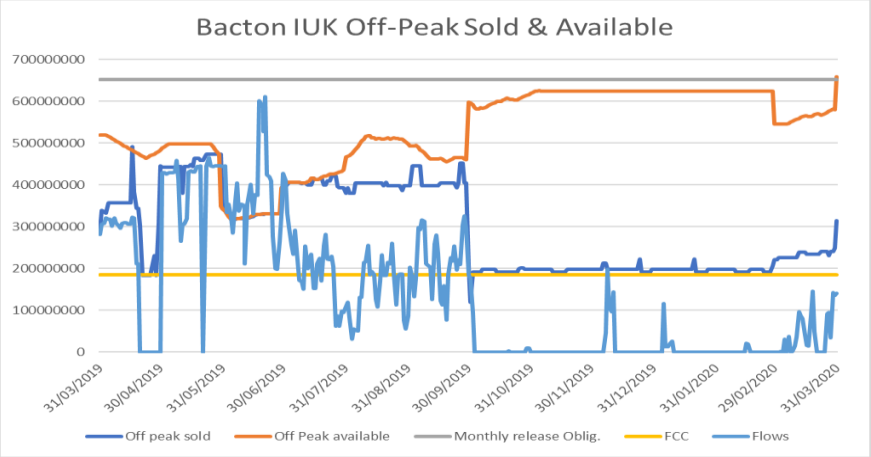
Figure 6 Rocksavage, Off-peak capacity bookings



Bacton IUK (interconnector)

Figure 7 shows a clear change in booking strategies over the period. From April to October, off-peak bookings are high, reducing from October onwards. This can be explained by the reduction in flows, however, it is worth noting that off-peak bookings are significantly higher than flows during this latter period.

Figure 7 Bacton IUK, Off-peak capacity bookings



Part 3. Impact of Modification 0678A on Entry Capacity firm reserve prices

Figure 8 shows that, on average and in absolute terms, reserve prices at NTS Entry Points will increase by a multiple of 76

Figure 8 Comparison of firm entry reserve prices

Entry Point	MSEC Oct 20	PS Oct 20	Multiple Increase
Bacton	0.0095	0.0429	4.52
Barow	0.0015	0.0429	28.60
Easington	0.0149	0.0429	2.88

Isle of Grain	0.0001	0.0429	429.00
Milford Haven	0.0235	0.0429	1.83
St Fergus	0.0532	0.0429	0.81
Teesside	0.0087	0.0429	4.93
Theddlethorpe	0.0134	0.0429	3.20
Hatfield Moor	0.0035	0.0429	12.26
Barton Stacey	0.0001	0.02145	214.50
Cheshire	0.0001	0.02145	214.50
Garton	0.013	0.02145	1.65
Hole House	0.0001	0.02145	214.50
Hornsea	0.014	0.02145	1.53
Hatfield Moor Store	0.0035	0.02145	6.13
Average	**0.0106**	**0.5148**	**76.06**

Part 4. Impact of Modification 0678A on Exit Capacity firm reserve prices

Figure 9 shows that, on average and in absolute terms, reserve prices at NTS Exit Points will increase by a multiple of 57.

Figure 9 Comparison of firm exit reserve prices

Exit Point	Offtake	19/20 prices	PS Oct 20	Multiple Increase
Apache (Sage Black Start)	INDUSTRIAL	0.0001	0.0172	172.00
Barrow (Black Start)	INDUSTRIAL	0.0102	0.0172	1.69
Billingham ICI (Terra Billingham)	INDUSTRIAL	0.0001	0.0172	172.00
Bishop Auckland (test facility)	INDUSTRIAL	0.0023	0.0172	7.48
Blackness (BP Grangemouth)	INDUSTRIAL	0.0001	0.0172	172.00
Centrax Industrial	INDUSTRIAL	0.0309	0.0172	0.56
Ferny Knoll (AM Paper)	INDUSTRIAL	0.0222	0.0172	0.77
Goole (Guardian Glass)	INDUSTRIAL	0.0036	0.0172	4.78
Harwarden (Shotton, aka Shotton Paper)	INDUSTRIAL	0.031	0.0172	0.55
Hollingsgreen (Hays Chemicals)	INDUSTRIAL	0.0271	0.0172	0.63
Phillips Petroleum,	INDUSTRIAL	0.0001	0.0172	172.00

Teesside				
Pickmere (Winnington Power, aka Brunner Mond)	INDUSTRIAL	0.0262	0.0172	0.66
Rollswood Kintore	INDUSTRIAL	0.0001	0.0172	172.00
Saltend BPHP (BP Saltend HP)	INDUSTRIAL	0.0001	0.0172	172.00
Sandy Lane (Blackburn CHP, aka Sappi Paper Mill)	INDUSTRIAL	0.0207	0.0172	0.83
Seal Sands TGPP	INDUSTRIAL	0.0001	0.0172	172.00
Shellstar (aka Kemira, not Kemira CHP)	INDUSTRIAL	0.0303	0.0172	0.57
Shotwick (Bridgewater Paper)	INDUSTRIAL	0.0307	0.0172	0.56
St. Fergus (Shell Blackstart)	INDUSTRIAL	0.0001	0.0172	172.00
Teesside (BASF, aka BASF Teesside)	INDUSTRIAL	0.0001	0.0172	172.00
Teesside Hydrogen	INDUSTRIAL	0.0001	0.0172	172.00
Terra Nitrogen (aka ICI, Terra Severnside)	INDUSTRIAL	0.0193	0.0172	0.89
Thornton Curtis (Humber Refinery, aka Immingham)	INDUSTRIAL	0.0001	0.0172	172.00
Upper Neeston (Milford Haven Refinery)	INDUSTRIAL	0.0001	0.0172	172.00
Weston Point (Castner Kelner, aka ICI Runcorn)	INDUSTRIAL	0.0308	0.0172	0.56
Zeneca (ICI Avecia, aka 'Zenica')	INDUSTRIAL	0.0001	0.0172	172.00
Air_Products (Teesside)	INDUSTRIAL	0.0001	0.0172	172.00
Fordoun CNG Station	INDUSTRIAL	0.0001	0.0172	172.00
St_Fergus_Segal	INDUSTRIAL	0.0001	0.0172	172.00
Kinneil CHP	INDUSTRIAL	0.0001	0.0172	172.00
Bacton (BBL)	INTERCONNECTOR	0.0001	0.0172	172.00
Bacton (IUK)	INTERCONNECTOR	0.0001	0.0172	172.00
Moffat (Irish	INTERCONNECTOR	0.0017	0.0172	10.12

Interconnector)				
Abson (Seabank Power Station phase I)	POWER STATION	0.0172	0.0172	1.00
Bacton (Great Yarmouth)	POWER STATION	0.0001	0.0172	172.00
Barking (Horndon)	POWER STATION	0.012	0.0172	1.43
Blyborough (Brigg)	POWER STATION	0.0064	0.0172	2.69
Blyborough (Cottam)	POWER STATION	0.0052	0.0172	3.31
Brine Field (Teesside) Power Station	POWER STATION	0.0001	0.0172	172.00
Burton Point (Connahs Quay)	POWER STATION	0.0311	0.0172	0.55
Caldecott (Corby Power Station)	POWER STATION	0.0129	0.0172	1.33
Carrington (Partington) Power Station	POWER STATION	0.0255	0.0172	0.67
Cockenzie Power Station	POWER STATION	0.0001	0.0172	172.00
Coryton 2 (Thames Haven) Power Station	POWER STATION	0.0116	0.0172	1.48
Deeside	POWER STATION	0.0311	0.0172	0.55
Didcot	POWER STATION	0.0231	0.0172	0.74
Drakelow Power Station	POWER STATION	0.0231	0.0172	0.74
Eastoft (Keadby Blackstart)	POWER STATION	0.0051	0.0172	3.37
Eastoft (Keadby)	POWER STATION	0.0051	0.0172	3.37
Enron Billingham	POWER STATION	0.0001	0.0172	172.00
Epping Green (Enfield Energy, aka Brimsdown)	POWER STATION	0.0154	0.0172	1.12
Gowkhall (Longannet)	POWER STATION	0.0001	0.0172	172.00
Grain Power Station	POWER STATION	0.0092	0.0172	1.87
Hatfield Power Station	POWER STATION	0.0032	0.0172	5.38
Langage Power Station	POWER STATION	0.0346	0.0172	0.50
Marchwood Power Station	POWER STATION	0.0301	0.0172	0.57
Medway (aka	POWER STATION	0.0093	0.0172	1.85

Isle of Grain Power Station, NOT Grain Power)				
Middle Stoke (Damhead Creek, aka Kingsnorth Power Station)	POWER STATION	0.0092	0.0172	1.87
Pembroke Power Station	POWER STATION	0.0001	0.0172	172.00
Peterborough (Peterborough Power Station)	POWER STATION	0.0095	0.0172	1.81
Roosecote Power Station (Barrow)	POWER STATION	0.0102	0.0172	1.69
Rosehill (Saltend Power Station)	POWER STATION	0.0001	0.0172	172.00
Ryehouse	POWER STATION	0.016	0.0172	1.08
Saddle Bow (Kings Lynn)	POWER STATION	0.0056	0.0172	3.07
Seabank (Seabank Power Station phase II)	POWER STATION	0.0194	0.0172	0.89
Sellafield Power Station	POWER STATION	0.0153	0.0172	1.12
Spalding 2 (South Holland) Power Station	POWER STATION	0.007	0.0172	2.46
St. Fergus (Peterhead)	POWER STATION	0.0001	0.0172	172.00
St. Neots (Little Barford)	POWER STATION	0.0139	0.0172	1.24
Stallingborough	POWER STATION	0.0001	0.0172	172.00
Stanford Le Hope (Coryton)	POWER STATION	0.0116	0.0172	1.48
Staythorpe	POWER STATION	0.0089	0.0172	1.93
Sutton Bridge Power Station	POWER STATION	0.0074	0.0172	2.32
Thornton Curtis (Killingholme)	POWER STATION	0.0001	0.0172	172.00
Tilbury Power Station	POWER STATION	0.0112	0.0172	1.54
Tonna (Baglan Bay)	POWER STATION	0.0001	0.0172	172.00
Trafford Power Station	POWER STATION	0.0255	0.0172	0.67
West Burton Power Station	POWER STATION	0.0053	0.0172	3.25
Weston Point	POWER STATION	0.0308	0.0172	0.56

(Rocksavage)				
Willington Power Station	POWER STATION	0.021	0.0172	0.82
Wragg Marsh (Spalding)	POWER STATION	0.007	0.0172	2.46
Wyre Power Station	POWER STATION	0.0193	0.0172	0.89
Palm_Paper	POWER STATION	0.0057	0.0172	3.02
Eggborough_PS	POWER STATION	0.0044	0.0172	3.91
KEADBY_2 PS	POWER STATION	0.0051	0.0172	3.37
Avonmouth Max Refill	STORAGE SITE	0.0194	0.0086	0.44
Bacton (Baird)	STORAGE SITE	0.0001	0.0086	86.00
Barrow (Bains)	STORAGE SITE	0.0102	0.0086	0.84
Barrow (Gateway)	STORAGE SITE	0.0102	0.0086	0.84
Barton Stacey Max Refill (Humbly Grove)	STORAGE SITE	0.0278	0.0086	0.31
Caythorpe	STORAGE SITE	0.0009	0.0086	9.56
Deborah Storage (Bacton)	STORAGE SITE	0.0001	0.0086	86.00
Dynevor Max Refill	STORAGE SITE	0.0001	0.0086	86.00
Garton Max Refill (Aldbrough)	STORAGE SITE	0.0001	0.0086	86.00
Glenmavis Max Refill	STORAGE SITE	0.0001	0.0086	86.00
Hatfield Moor Max Refill	STORAGE SITE	0.0042	0.0086	2.05
Hill Top Farm (Hole House Farm)	STORAGE SITE	0.027	0.0086	0.32
Hole House Max Refill	STORAGE SITE	0.027	0.0086	0.32
Holford	STORAGE SITE	0.0263	0.0086	0.33
Hornsea Max Refill	STORAGE SITE	0.0001	0.0086	86.00
Partington Max Refill	STORAGE SITE	0.0255	0.0086	0.34
Saltfleetby Storage (Theddlethorpe)	STORAGE SITE	0.0001	0.0086	86.00
Stublach (Cheshire)	STORAGE SITE	0.0263	0.0086	0.33
Rough Max Refill	STORAGE SITE	0.0001	0.0086	86.00
Average		**0.01034712**	**0.015629**	**57.39**

Part 5. Impact of alternative entry multipliers

Figure 10 shows the impact of applying an overrun multiplier of 3 based on forecast reserve prices generated by Modification 0678. In comparison to the current arrangements, Overrun Charges increase by a multiple of 28

Figure 10 Impact of alternative entry multipliers

Entry Point	8x MSEC	3x PS	Multiple Increase
Bacton	0.076	0.1287	1.693421053
Barow	0.012	0.1287	10.725
Easington	0.1192	0.1287	1.079697987
Isle of Grain	0.0008	0.1287	160.875
Milford Haven	0.188	0.1287	0.684574468
St Fergus	0.4256	0.1287	0.302396617
Teesside	0.0696	0.1287	1.849137931
Theddlethorpe	0.1072	0.1287	1.200559701
Hatfield Moor	0.028	0.1287	4.596428571
Barton Stacey	0.0008	0.06435	80.4375
Cheshire	0.0008	0.06435	80.4375
Garton	0.104	0.06435	0.61875
Hole House	0.0008	0.06435	80.4375
Hornsea	0.112	0.06435	0.574553571
Hatfield Moor Store	0.028	0.06435	2.298214286
Average	**0.084853**	**0.10296**	**28.52068228**

Part 6. Impact of alternative exit multipliers

Figure 11 shows the impact of applying an overrung multiplier of 6 based on forecast reserve prices generated by Modification 0678. In comparison to the current arrangements, Overrun Charges increase by a multiple of 43.

Figure 11 Impact of alternative exit multipliers

Exit Point	Offtake	8x MSEC	6x PS	Multiple Increase
Apache (Sage Black Start)	INDUSTRIAL	0.0008	0.1032	129
Barrow (Black Start)	INDUSTRIAL	0.0816	0.1032	1.264705882
Billingham ICI (Terra Billingham)	INDUSTRIAL	0.0008	0.1032	129
Bishop Auckland (test facility)	INDUSTRIAL	0.0184	0.1032	5.608695652
Blackness (BP Grangemouth)	INDUSTRIAL	0.0008	0.1032	129
Centrax Industrial	INDUSTRIAL	0.2472	0.1032	0.417475728
Ferny Knoll (AM Paper)	INDUSTRIAL	0.1776	0.1032	0.581081081
Goole (Guardian Glass)	INDUSTRIAL	0.0288	0.1032	3.583333333
Harwarden (Shotton, aka Shotton Paper)	INDUSTRIAL	0.248	0.1032	0.416129032
Hollingsgreen (Hays Chemicals)	INDUSTRIAL	0.2168	0.1032	0.47601476
Phillips Petroleum, Teesside	INDUSTRIAL	0.0008	0.1032	129
Pickmere (Winnington Power, aka Brunner Mond)	INDUSTRIAL	0.2096	0.1032	0.492366412

Rollswood Kintore	INDUSTRIAL	0.0008	0.1032	129
Saltend BPHP (BP Saltend HP)	INDUSTRIAL	0.0008	0.1032	129
Sandy Lane (Blackburn CHP, aka Sappi Paper Mill)	INDUSTRIAL	0.1656	0.1032	0.623188406
Seal Sands TGPP	INDUSTRIAL	0.0008	0.1032	129
Shellstar (aka Kemira, not Kemira CHP)	INDUSTRIAL	0.2424	0.1032	0.425742574
Shotwick (Bridgewater Paper)	INDUSTRIAL	0.2456	0.1032	0.42019544
St. Fergus (Shell Blackstart)	INDUSTRIAL	0.0008	0.1032	129
Teesside (BASF, aka BASF Teesside)	INDUSTRIAL	0.0008	0.1032	129
Teesside Hydrogen	INDUSTRIAL	0.0008	0.1032	129
Terra Nitrogen (aka ICI, Terra Severnside)	INDUSTRIAL	0.1544	0.1032	0.668393782
Thornton Curtis (Humber Refinery, aka Immingham)	INDUSTRIAL	0.0008	0.1032	129
Upper Neeston (Milford Haven Refinery)	INDUSTRIAL	0.0008	0.1032	129
Weston Point (Castner Kelner, aka ICI Runcorn)	INDUSTRIAL	0.2464	0.1032	0.418831169
Zeneca (ICI Avecia, aka 'Zenica')	INDUSTRIAL	0.0008	0.1032	129
Air_Products (Teesside)	INDUSTRIAL	0.0008	0.1032	129
Fordoun CNG Station	INDUSTRIAL	0.0008	0.1032	129
St_Fergus_Segal	INDUSTRIAL	0.0008	0.1032	129
Kinneil CHP	INDUSTRIAL	0.0008	0.1032	129
Bacton (BBL)	INTERCONNECTOR	0.0008	0.1032	129
Bacton (IUK)	INTERCONNECTOR	0.0008	0.1032	129
Moffat (Irish Interconnector)	INTERCONNECTOR	0.0136	0.1032	7.588235294
Abson (Seabank Power Station phase I)	POWER STATION	0.1376	0.1032	0.75
Bacton (Great Yarmouth)	POWER STATION	0.0008	0.1032	129
Barking (Horndon)	POWER STATION	0.096	0.1032	1.075
Blyborough (Brigg)	POWER STATION	0.0512	0.1032	2.015625
Blyborough (Cottam)	POWER STATION	0.0416	0.1032	2.480769231
Brine Field (Teesside) Power Station	POWER STATION	0.0008	0.1032	129
Burton Point (Connahs Quay)	POWER STATION	0.2488	0.1032	0.414790997
Caldecott (Corby Power Station)	POWER STATION	0.1032	0.1032	1
Carrington (Partington) Power Station	POWER STATION	0.204	0.1032	0.505882353
Cockenzie Power Station	POWER STATION	0.0008	0.1032	129
Coryton 2 (Thames Haven) Power Station	POWER STATION	0.0928	0.1032	1.112068966
Deeside	POWER STATION	0.2488	0.1032	0.414790997
Didcot	POWER STATION	0.1848	0.1032	0.558441558
Drakelow Power Station	POWER STATION	0.1848	0.1032	0.558441558
Eastoft (Keadby Blackstart)	POWER STATION	0.0408	0.1032	2.529411765
Eastoft (Keadby)	POWER STATION	0.0408	0.1032	2.529411765
Enron Billingham	POWER STATION	0.0008	0.1032	129
Epping Green (Enfield Energy, aka Brimsdown)	POWER STATION	0.1232	0.1032	0.837662338
Gowkhall (Longannet)	POWER STATION	0.0008	0.1032	129
Grain Power Station	POWER STATION	0.0736	0.1032	1.402173913

Hatfield Power Station	POWER STATION	0.0256	0.1032	4.03125
Langage Power Station	POWER STATION	0.2768	0.1032	0.37283237
Marchwood Power Station	POWER STATION	0.2408	0.1032	0.428571429
Medway (aka Isle of Grain Power Station, NOT Grain Power)	POWER STATION	0.0744	0.1032	1.387096774
Middle Stoke (Damhead Creek, aka Kingsnorth Power Station)	POWER STATION	0.0736	0.1032	1.402173913
Pembroke Power Station	POWER STATION	0.0008	0.1032	129
Peterborough (Peterborough Power Station)	POWER STATION	0.076	0.1032	1.357894737
Roosecote Power Station (Barrow)	POWER STATION	0.0816	0.1032	1.264705882
Rosehill (Saltend Power Station)	POWER STATION	0.0008	0.1032	129
Ryehouse	POWER STATION	0.128	0.1032	0.80625
Saddle Bow (Kings Lynn)	POWER STATION	0.0448	0.1032	2.303571429
Seabank (Seabank Power Station phase II)	POWER STATION	0.1552	0.1032	0.664948454
Sellafield Power Station	POWER STATION	0.1224	0.1032	0.843137255
Spalding 2 (South Holland) Power Station	POWER STATION	0.056	0.1032	1.842857143
St. Fergus (Peterhead)	POWER STATION	0.0008	0.1032	129
St. Neots (Little Barford)	POWER STATION	0.1112	0.1032	0.928057554
Stallingborough	POWER STATION	0.0008	0.1032	129
Stanford Le Hope (Coryton)	POWER STATION	0.0928	0.1032	1.112068966
Staythorpe	POWER STATION	0.0712	0.1032	1.449438202
Sutton Bridge Power Station	POWER STATION	0.0592	0.1032	1.743243243
Thornton Curtis (Killingholme)	POWER STATION	0.0008	0.1032	129
Tilbury Power Station	POWER STATION	0.0896	0.1032	1.151785714
Tonna (Baglan Bay)	POWER STATION	0.0008	0.1032	129
Trafford Power Station	POWER STATION	0.204	0.1032	0.505882353
West Burton Power Station	POWER STATION	0.0424	0.1032	2.433962264
Weston Point (Rocksavage)	POWER STATION	0.2464	0.1032	0.418831169
Willington Power Station	POWER STATION	0.168	0.1032	0.614285714
Wragg Marsh (Spalding)	POWER STATION	0.056	0.1032	1.842857143
Wyre Power Station	POWER STATION	0.1544	0.1032	0.668393782
Palm_Paper	POWER STATION	0.0456	0.1032	2.263157895
Eggborough_PS	POWER STATION	0.0352	0.1032	2.931818182
KEADBY_2 PS	POWER STATION	0.0408	0.1032	2.529411765
Avonmouth Max Refill	STORAGE SITE	0.1552	0.0516	0.332474227
Bacton (Baird)	STORAGE SITE	0.0008	0.0516	64.5
Barrow (Bains)	STORAGE SITE	0.0816	0.0516	0.632352941
Barrow (Gateway)	STORAGE SITE	0.0816	0.0516	0.632352941
Barton Stacey Max Refill (Humbly Grove)	STORAGE SITE	0.2224	0.0516	0.232014388
Caythorpe	STORAGE SITE	0.0072	0.0516	7.166666667
Deborah Storage (Bacton)	STORAGE SITE	0.0008	0.0516	64.5
Dynevor Max Refill	STORAGE SITE	0.0008	0.0516	64.5
Garton Max Refill (Aldbrough)	STORAGE SITE	0.0008	0.0516	64.5
Glenmavis Max Refill	STORAGE SITE	0.0008	0.0516	64.5
Hatfield Moor Max Refill	STORAGE SITE	0.0336	0.0516	1.535714286
Hill Top Farm (Hole House Farm)	STORAGE SITE	0.216	0.0516	0.238888889
Hole House Max Refill	STORAGE SITE	0.216	0.0516	0.238888889

Holford	STORAGE SITE	0.2104	0.0516	0.245247148
Hornsea Max Refill	STORAGE SITE	0.0008	0.0516	64.5
Partington Max Refill	STORAGE SITE	0.204	0.0516	0.252941176
Saltfleetby Storage (Theddlethorpe)	STORAGE SITE	0.0008	0.0516	64.5
Stublach (Cheshire)	STORAGE SITE	0.2104	0.0516	0.245247148
Rough Max Refill	STORAGE SITE	0.0008	0.0516	64.5
Average		**0.082777**	**0.093773**	**43.04057818**