

# Optional Charge Analysis

## Document Revision History

<b>Version / Revision Number</b>	<b>Date of Issue</b>	<b>Notes</b>
V1.0	21 March 2019	Version to accompany workgroup report for 0678G/H/I/J
V1.1	02 April 2019	Inclusion of modification 0678D Additional analysis included at the end of the document for all modifications for gas year 2020/21 and running 2019/20 with existing contract removed
V1.2	05 April 2019	Updates based on NTSCMF actions.
V1.3	09 April 2019	Correction of Formula represented in 0678D/G/H/J – now reflects formula from Modifications and what was used in analysis.

## Contents

<b>INTRODUCTION .....</b>	<b>4</b>
<b>ASSUMPTIONS .....</b>	<b>5</b>
<b>WORKGROUP ACTIONS .....</b>	<b>6</b>
<b>MODIFICATIONS.....</b>	<b>8</b>
<b>UNC0678B - AMENDMENTS TO GAS TRANSMISSION CHARGING REGIME .....</b>	<b>8</b>
<b>UNC0678D - AMENDMENTS TO GAS TRANSMISSION CHARGING REGIME INCLUDING A COST BASED OPTIONAL CAPACITY CHARGE .....</b>	<b>10</b>
<b>UNC0678G - AMENDMENTS TO GAS TRANSMISSION CHARGING REGIME INCLUDING A COST BASED OPTIONAL CAPACITY CHARGE .....</b>	<b>13</b>
<b>UNC0678H - AMENDMENTS TO GAS TRANSMISSION CHARGING REGIME (POSTAGE STAMP) INCLUDING A COST BASED OPTIONAL CAPACITY CHARGE .....</b>	<b>16</b>
<b>UNC0678I - AMENDMENTS TO GAS TRANSMISSION CHARGING REGIME INCLUDING WHEELING AND AN IRELAND SECURITY CHARGE .....</b>	<b>18</b>
<b>UNC0678J - AMENDMENTS TO GAS CHARGING REGIME (POSTAGE STAMP) INCLUDING A COST BASED OPTIONAL CAPACITY CHARGE .....</b>	<b>21</b>
<b>ADDITIONAL ANALYSIS RESULTS.....</b>	<b>24</b>

## INTRODUCTION

1. The following analysis has been completed by National Grid in support of UNC0678 Workgroup <http://www.gasgovernance.co.uk/index.php/0678>. It is intended to provide indicative information regarding the potential impact of any optional charges or lack thereof.
2. Due to the commercially sensitive nature of NTS Optional Commodity Charge (NTS OCC) data, this analysis could only be undertaken by National Grid on behalf of proposers with optional charge components within their respective modifications. All data corresponding to the existing NTS OCC and any subsequent charges arising from the analysis will be presented at an aggregated level.
3. Where relevant, the analysis uses the UNC0678 V3.1 CWD Transmission Services - Sensitivity Model<sup>1</sup>. This is an illustrative model and should always be considered as such. It provides support to UNC0678 Modification and is a sensitivity tool to demonstrate the way in which charges under UNC0678 would be calculated, and as a result the same consideration should be taken when reviewing this Optional Charge analysis.
4. This analysis is structured in the following way:
  - (a) Description of the assumptions that have been made in order to carry out a consistent method of analysis
  - (b) Some non-modification specific analysis, related to actions raised in UNC0678 Workgroup and UNC0670R Workgroup.
  - (c) Analysis of any specific UNC0678 modifications that contain an optional charge, which consists of:
    - i. an assessment of the number of routes applicable
    - ii. the potential under recovery of transmission services revenue the specified charges could generate
    - iii. the indicative impact this could have on reference and reserve prices for the relevant RPM and the same approach on non-transmission charges.

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<sup>1</sup> <http://www.gasgovernance.co.uk/index.php/0678/Models>

## Assumptions

5. In order to carry out the analysis on the current NTS OCC and any optional charges raised by the UNC0678 Modifications in a consistent manner, the following assumptions or limitations have been made:
  - (a) Users and routes based on NTS OCC historical flows and revenues from October 2017 to September 2018 (Gas Year 2017/18), replicating Gas Year format of the sensitivity tool.
  - (b) Assessment is undertaken at NTS OCC route level basis, not shipper level.
  - (c) Assessment is undertaken against Modification UNC0678 as a base case.
  - (d) No behavioural changes are assumed. All NTS OCC routes and flows used during Gas Year 2017/18 are considered to use any new optional charge proposed, on the condition the charge is less than the prevailing firm RPM entry and exit prices.
  - (e) No consideration is given between users of the proposed optional charges and users that hold Existing Contracts. Optional charge price comparisons are assessed between prevailing firm RPM reference and reserve prices only. Where reference prices are referred to, these are prices from the Sensitivity Model following the first calculation of prices, prior to adjustment for interruptible/off peak or storage/LNG discounts. Therefore these reference prices include multipliers (all set at 1).
  - (f) For the purpose of this assessment, the Forecasted Contracted Capacity (FCC) as defined in the FCC Methodology Statement<sup>2</sup> is considered to be 100% accurate.
  - (g) For the purpose of calculating adjustments within the sensitivity model, perfect foresight of applicable quantities for the optional charge is assumed in order to give indicative reserve price increases to account for optional charge under recovery.
  - (h) It is assumed sufficient capacity has been procured, e.g. capacity bookings are not less than any optional charge related flows
  - (i) Any further modification specific sensitivity analysis or assumptions are stated where necessary

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<sup>2</sup> <https://gasgov-mst-files.s3.eu-west-1.amazonaws.com/s3fs-public/ggf/book/2019-03/Forecasted%20Contracted%20Capacity%20v1.0.pdf>

## Workgroup Actions

6. The NTS OCC historical flows and revenues from Gas Year 2017/18 have been used to carry out non-modification specific analysis, related to actions raised in UNC0678 Workgroup and UNC0670R Workgroup.

7. UNC0678 workgroup action: 02-0502

*Action Shorthaul: National Grid to provide some analysis on Shorthaul and the effect of cessation of Shorthaul on existing users and customers currently using Shorthaul services.*

8. UNC067R workgroup actions: 0201, 0202

*National Grid to provide analysis based around a comparison between UNC Modifications 0670R and 0678, including existing versus future usage predications; limiting factors for sites in or around the NTS; generic costs and cost of gas and gas sources in respect of construction of a pipeline*

*National Grid to provide analysis based upon the UNC Modification 0678 model and to also look to provide a view on the potential NTS Revenue Sensitivity Risk Assessment aspects.*

9. Summary of NTS OCC use for Gas Year 2017/18. There are 54 NTS Offtakes registered for the application of the NTS OCC. 37 Offtakes registered eligible flows during 2017/18 from 10 entry points.

The average represented in Table 1 corresponds to the mean average distance. For the active offtakes the median distance is 24km, the mode is 0km.

	Flow on OCC (GWh)	OCC Revenue	Amount OCC flows would pay in Commodity Revenue if no OCC	Amount redistributed to non-OCC users	Offtakes registered for OCC	Active Offtakes OCC in 2017/18	Active Offtake Route Average Distance (km)	Active Offtake Route Max Distance (km)
<b>GY 2017/18</b>	244,508	£34,221,109	£172,930,731	£138,709,623	54	37	55	274

Table 1: NTS OCC Summary for Gas Year 2017/18

10. Comparisons between the effect of the cessation of the NTS OCC for UNC0678 are complicated due to the move away from commodity based revenue recovery mechanisms. The charges incurred by different users will depend on a number of parameters.

### NTS Revenue Sensitivity Risk Assessment

11. A key discussion within the UNC0670R Workgroup was the potential impact of lost revenue due to the construction of independent pipelines, a risk identified when the NTS OCC is no longer available.
12. Analysis on the change in Entry and Exit capacity prices for Gas Year 2019/20, using the UNC0678 V3.1 CWD Transmission Services - Sensitivity Model, has been completed on three sensitivities on the NTS OCC user base and historical data set from Gas Year 2017/18. The sensitivities are the removal of:

- (a) NTS OCC routes with a straight-line distance of less than 20km
- (b) NTS OCC routes with a straight-line distance of less than 30km
- (c) NTS OCC routes where more than 80% of the flow observed at the offtake corresponds to NTS OCC
- (d) All NTS OCC routes

13. This analysis is achieved through running the sensitivity model with the relevant Exit Point FCC removed and the corresponding Entry Point FCC reduced by the same amount. UNC0678 CWD RPM parameters are used to produce a range of increase in Standard Firm Reserve Prices when NTS OCC route FCC removed as per sensitivities

	NTS OCC routes less than 20km	NTS OCC routes less than 30km	NTS OCC routes with >80% NTS OCC flow	All NTS OCC routes
<b>Entry</b>	<b>+16% to +23%</b>	<b>+24% to +32%</b>	<b>+34% to +45%</b>	<b>+46% to +54%</b>
<b>Exit</b>	<b>+11% to +18%</b>	<b>+14% to +21%</b>	<b>+18% to +26%</b>	<b>+29% to +35%</b>
<b>No of Active Offtake</b>	<b>17</b>	<b>22</b>	<b>23</b>	<b>37</b>

Table 2a: Range of increase in Standard Firm Reserve Prices, CWD RPM 2019/20

14. The following table completes the same analysis but merely reduces the relevant FCC by the NTS OCC flows, rather than removing the route entirely.

	NTS OCC routes less than 20km	NTS OCC routes less than 30km	NTS OCC routes with >80% NTS OCC flow	All NTS OCC routes
<b>Entry</b>	<b>+8% to +12%</b>	<b>+12% to +16%</b>	<b>+19% to +23%</b>	<b>+21% to +24%</b>
<b>Exit</b>	<b>+4% to +7%</b>	<b>+5% to +8%</b>	<b>+9% to +13%</b>	<b>+10% to +14%</b>

Table 2b: Range of increase in Standard Firm Reserve Prices, CWD RPM 2019/20

15. Non-Transmission Service Charges comparison between UNC0678 rate (p/kWh) and if all observed Gas Year 2017/18 NTS OCC flows are removed from the system.

	678	All NTS OCC routes removed
Non-Tx rate	0.0140	0.0201

Table 3: Non-Transmission Service Charges with NTS OCC flows removed, 2019/20

## Modifications

16. For the full detail behind the relevant optional charges and their application, please refer to the relevant Modification (<http://www.gasgovernance.co.uk/index.php/0678>)

## UNC0678B - Amendments to Gas Transmission Charging Regime

### Introduction

17. From UNC Mod 678B:

#### Optional Capacity Charge

*The proposal will introduce a new approach to NTS optional charging that will enable National Grid to continue to offer transportation services that result in the efficient use of its gas network. The new method is a natural extension of the capacity weighted distance methodology. Optional Capacity Charges will be generated by formulae described in the Solution section. The Optional Capacity charge arrangements will, in the view of the Proposer, provide for a more cost-reflective application of the CWD Methodology, encourage greater use of the NTS by way of avoiding inefficient bypass (whether via onshore or offshore gas pipelines) and facilitate the delivery of gas to the GB market. It will also support the efficient flow of gas across all GB Interconnection Points.*

### Optional Charge Availability

18. NTS Optional Capacity Charge Formula:

**NTS Optional Entry Capacity Charge =  $D / \text{CWD}_{\text{en}} \times \text{R}_{\text{Pen}} / \text{SUF}$**  and

**NTS Optional Exit Capacity Charge =  $D / \text{CWD}_{\text{ex}} \times \text{R}_{\text{Pex}} / \text{SUF}$**  where

- i. D is the straight-line distance between the entry and exit point,
- ii.  $\text{CWD}_{\text{en}}$  is the capacity weighted distance for the entry point,
- iii.  $\text{CWD}_{\text{ex}}$  is the capacity weighted distance for the exit point,
- iv.  $\text{R}_{\text{Pen}}$  is the prevailing capacity reserve price for the entry point,
- v.  $\text{R}_{\text{Pex}}$  is the prevailing capacity reserve price for the exit point, and



vi. SUF is the System Utilisation Factor

19. All currently observed routes would qualify for a lower NTS Optional Capacity Charge than the prevailing RPM from the sensitivity model for Gas Year 2019/20. System Utilisation Factor for 2019/20 is 60.1%

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678B	Optional Charge flow (based on 2017/18 GY) GWh	244,508

Table 4: Optional charge flow 2019/20 assumed, compared to GY 2017/18 actuals

## Revenue

20. Based on the availability of the optional charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.

21. The sensitivity model is run to calculate reference prices under the CWD RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts.

Optional charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Optional Charges.

			Entry	Exit
2019/20	678	Total Revenue Recovered (£):	327,187,973	320,717,255
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-10,635,218	-17,105,935
2019/20	678	Rev from Optional Charge flow @ 678 capacity prices	74,466,117	36,252,699
2019/20	678B	Rev from Optional Charge flow @ 678B capacity prices	16,969,270	7,554,735
		678B Under Recovery	-57,496,847	-28,697,965

Table 5: Optional charge assumed under recovery

## Prices

22. This initial under recovery of revenue is fed into the 0678B Version of the Sensitivity Model<sup>3</sup> in order to go through multiple iterations of RPM price increases. This is required due to the Optional Charge being a dynamic formula. In addition to the increase of reference and reserve prices, the optional charge also increases until an equilibrium has been achieved.

<sup>3</sup> <https://gasgov-mst-files.s3.eu-west-1.amazonaws.com/s3fs-public/ggf/book/2019-03/0678B%20Transmission%20Services%20CWD%20Model%20V3%20%2821%20March%202019%29.xlsm>

23. The FCC for all sites remains unchanged so prices are increased at a standard distribution in line with the FCC.

	Impact to reference prices	Impact to reserve prices
Entry	+35%	+25%
Exit	+15%	+9%

Table 6: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678B CWD RPM 2019/20

24. Non-Transmission Services price increase driven by a reduction in applicable flows, with Optional Charge flows excluded

	678	678B
Non-Tx rate	0.0140	0.0201

Table 7: Non-Transmission Service Charges with 678B Optional Charge flows removed, 2019/20

## UNC0678D - Amendments to Gas Transmission Charging Regime including a Cost based Optional Capacity Charge

### Introduction

25. From UNC Mod 678D:

#### NTS Optional Capacity Charge

*This proposal 0678D will introduce a new capacity based charge that discourages inefficient bypass of the NTS. The new NTS Optional Capacity charge is calculated by applying an equation which relates to the cost of providing pipeline capability to support a particular load size and distance travelled from a nominated NTS Entry Point to the particular NTS Exit Point to derive a unit cost in pence per kWh. The resultant cost from the equation is converted into a capacity cost by application of the site specific FCC and MNEPOR. The charge is then apportioned 50:50 between entry and exit and the Users opting to accept the charge commit to making payments equivalent to the cost of booking one year of capacity (at entry and exit) at the FCC level of the qualifying NTS Exit Point. The NTS Optional Capacity charge arrangements will, in the view of the Proposer, encourage greater use of the NTS by way of avoiding inefficient bypass (whether via onshore or offshore gas pipelines) and facilitate the delivery of gas to the GB market. It will also support the efficient flow of gas across all GB interconnection points*

**Optional Charge Availability**

26. NTS Optional Capacity Charge Formula

OCC rate formula for 2019/20:

$$\text{OCC (p/kWh)} = [862.64 * (M)^{-0.79} * D + 735.1 * (M)^{-0.7}]$$

D is the direct distance of the site or non-National Grid NTS Pipeline to the elected Entry Terminal as the crow flies.

M is the Maximum NTS Exit Point Offtake Rate (MNEPOR) at the site, converted into kWh/day.

^ means 'to the power of..'

Capacity rate:

Daily pipeline cost (p/day) by application of the following:

$$\text{Daily Pipeline cost} = \text{OCC rate} * \text{MNEPOR}$$

NTS Optional Capacity rate (p/kWh/day) by application of the following:

$$\text{NTS Optional Capacity rate} = \text{Daily Pipeline cost} / \text{FCC}$$

$$\text{NTS Exit OCC rate} = \text{NTS Optional Capacity rate} / 2$$

$$\text{NTS Entry OCC rate} = \text{NTS Optional Capacity rate} / 2$$

Annual NTS OCC Fee:

$$\text{Annual NTS Optional Capacity Fee} = (\text{FCC} * \text{NTS Exit OCC Rate} + \text{FCC} * \text{NTS Entry OCC Rate}) * 365 - (\sum \text{OCC Entry Charges} + \sum \text{OCC Exit Charges})$$

Where

$\sum$ OCC Entry Charges = sum of all Users OCC Entry Charges for the OCC Route

And

$\sum$ OCC Exit Charges = sum of all Users OCC Exit Charges for the OCC Route

27. 17 of the currently observed routes would qualify for a lower NTS Optional Capacity Charges for entry and exit than the prevailing RPM from the sensitivity model for Gas Year 2019/20, therefore are considered to take the optional capacity charge.

28. These 17 routes are under 30km in straight-line distance and would constitute 59% of the actual flows observed in Gas Year 2017/18

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678D	Optional Charge flow (based on 2017/18 GY) GWh	143,292

Table 8: Optional charge flow 2019/20 assumed, compared to GY 2017/18 actuals

## Revenue

29. Based on the availability of the optional charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.
30. The sensitivity model is run to calculate reference prices under the CWD RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts.  
Optional charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Optional Charges.
31. The Annual NTS OCC Fee is an indicative value of revenue that could be recovered if capacity bookings are below FCC levels at the relevant exit points.

			Entry	Exit
2019/20	678	Total Revenue Recovered (£):	327,187,973	320,717,255
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-10,635,218	-17,105,935
2019/20	678D	Rev from Optional Charge flow @ 678 capacity prices	45,929,336	21,578,437
		Rev from Optional Charge flow @ 678D capacity prices	5,102,872	5,102,872
		Annual OCC Fee	5,928,056	5,928,056
		678D Under Recovery	-34,898,408	-10,547,509

Table 9: Optional charge assumed under recovery

## Prices

32. This anticipated under recovery of revenue is fed into the adjustment calculation of the Sensitivity Model to demonstrate the indicative impact on prices, given perfect foresight of the flows that qualify for the Optional Charge.
33. The FCC for relevant Exit Points and the corresponding Entry Points are reduced by the flows observed. This leads to a recalculation of prices that vary between points in terms of percentage increase.

	Impact to reference prices	Impact to reserve prices
Entry	+30% to +34%	+25% to +29%
Exit	+14% to +18%	+8% to +12%

Table 10: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678D CWD RPM 2019/20

34. Non-Transmission Services price increase driven by a reduction in applicable flows, with Optional Charge flows excluded

	678	678G
Non-Tx rate	0.0140	0.0170

Table 11: Non-Transmission Service Charges with 678D Optional Charge flows removed, 2019/20

## UNC0678G - Amendments to Gas Transmission Charging Regime including a Cost based Optional Capacity Charge

### Introduction

35. From UNC Mod 678G:

#### NTS Optional Capacity Charge

*This proposal 0678G will introduce a new capacity based charge that discourages inefficient bypass of the NTS. The new NTS Optional Capacity charge is calculated by applying an equation which relates to the cost of providing pipeline capability to support a particular load size and distance travelled from a nominated NTS Entry Point to the particular NTS Exit Point to derive a unit cost in pence per kWh. The resultant cost from the equation is converted into a capacity cost by application of the site specific FCC and MNEPOR. The charge is then apportioned 50:50 between entry and exit and the Users opting to accept the charge commit to making payments equivalent to the cost of booking one year of capacity (at entry and exit) at the FCC level of the qualifying NTS Exit Point. The NTS Optional Capacity charge arrangements will, in the view of the Proposer, encourage greater use of the NTS by way of avoiding inefficient bypass (whether via onshore or offshore gas pipelines) and facilitate the delivery of gas to the GB market. It will also support the efficient flow of gas across all GB interconnection points*

### Optional Charge Availability

36. NTS Optional Capacity Charge Formula

OCC rate formula for 2019/20:

$$\text{OCC (p/kWh)} = [862.64 * (M)^{-0.79}] * D + 735.1 * (M)^{-0.7}$$

D is the direct distance of the site or non-National Grid NTS Pipeline to the elected Entry Terminal as the crow flies.

M is the Maximum NTS Exit Point Offtake Rate (MNEPOR) at the site, converted into kWh/day.

^ means 'to the power of..'

Capacity rate:

Daily pipeline cost (p/day) by application of the following:

**Daily Pipeline cost = OCC rate \* MNEPOR**

NTS Optional Capacity rate (p/kWh/day) by application of the following:

**NTS Optional Capacity rate = Daily Pipeline cost/FCC**

**NTS Exit OCC rate = NTS Optional Capacity rate / 2**

**NTS Entry OCC rate = NTS Optional Capacity rate / 2**

Annual NTS OCC Fee:

**Annual NTS Optional Capacity Fee = (FCC x NTS Exit OCC Rate + FCC x NTS Entry OCC Rate) x 365 – (∑OCC Entry Charges + ∑OCC Exit Charges)**

Where

∑OCC Entry Charges = sum of all Users OCC Entry Charges for the OCC Route

And

∑OCC Exit Charges = sum of all Users OCC Exit Charges for the OCC Route

37. 17 of the currently observed routes would qualify for a lower NTS Optional Capacity Charges for entry and exit than the prevailing RPM from the sensitivity model for Gas Year 2019/20, therefore are considered to take the optional capacity charge.

38. These 17 routes are under 30km in straight-line distance and would constitute 59% of the actual flows observed in Gas Year 2017/18

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678G	Optional Charge flow (based on 2017/18 GY) GWh	143,292

Table 8: Optional charge flow 2019/20 assumed, compared to GY 2017/18 actuals

**Revenue**

39. Based on the availability of the optional charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.

40. The sensitivity model is run to calculate reference prices under the CWD RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts.

Optional charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Optional Charges.

41. The Annual NTS OCC Fee is an indicative value of revenue that could be recovered if capacity bookings are below FCC levels at the relevant exit points.

			Entry	Exit
2019/20	678	Total Revenue Recovered (£):	327,187,973	320,717,255
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-10,635,218	-17,105,935
2019/20	678G	Rev from Optional Charge flow @ 678 capacity prices	45,929,336	21,578,437
		Rev from Optional Charge flow @ 678G capacity prices	5,102,872	5,102,872
		Annual OCC Fee	5,928,056	5,928,056
		678G Under Recovery	-34,898,408	-10,547,509

Table 9: Optional charge assumed under recovery

**Prices**

- 42. This anticipated under recovery of revenue is fed into the adjustment calculation of the Sensitivity Model to demonstrate the indicative impact on prices, given perfect foresight of the flows that qualify for the Optional Charge.
- 43. The FCC for relevant Exit Points and the corresponding Entry Points are reduced by the flows observed. This leads to a recalculation of prices that vary between points in terms of percentage increase.

	Impact to reference prices	Impact to reserve prices
<b>Entry</b>	+30% to +34%	+25% to +29%
<b>Exit</b>	+14% to +18%	+8% to +12%

Table 10: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678G CWD RPM 2019/20

- 44. Non-Transmission Services price increase driven by a reduction in applicable flows, with Optional Charge flows excluded

	678	678G
<b>Non-Tx rate</b>	<b>0.0140</b>	<b>0.0170</b>

Table 11: Non-Transmission Service Charges with 678G Optional Charge flows removed, 2019/20

## UNC0678H - Amendments to Gas Transmission Charging Regime (Postage Stamp) including a Cost based Optional Capacity Charge

### Introduction

45. From UNC Mod 678H:

#### NTS Optional Capacity Charge

*This proposal 0678H will introduce a new capacity based charge that discourages inefficient bypass of the NTS. The new NTS Optional Capacity charge is calculated by applying an equation which relates to the cost of providing pipeline capability to support a particular load size and distance travelled from a nominated NTS Entry Point to the particular NTS Exit Point to derive a unit cost in pence per kWh. The resultant cost from the equation is converted into a capacity cost by application of the site specific FCC and MNEPOR. The charge is then apportioned 50:50 between entry and exit and the Users opting to accept the charge commit to making payments equivalent to the cost of booking one year of capacity (at entry and exit) at the FCC level of the qualifying NTS Exit Point. The NTS Optional Capacity charge arrangements will, in the view of the Proposer, encourage greater use of the NTS by way of avoiding inefficient bypass (whether via onshore or offshore gas pipelines) and facilitate the delivery of gas to the GB market. It will also support the efficient flow of gas across all GB interconnection points*

### Optional Charge Availability

46. NTS Optional Capacity Charge Formula

OCC rate formula for 2019/20:

$$\text{OCC (p/kWh)} = [862.64 * (M)^{-0.79} * D + 735.1 * (M)^{-0.7}]$$

D is the direct distance of the site or non-National Grid NTS Pipeline to the elected Entry Terminal as the crow flies.

M is the Maximum NTS Exit Point Offtake Rate (MNEPOR) at the site, converted into kWh/day.

^ means 'to the power of..'

Capacity rate:

Daily pipeline cost (p/day) by application of the following:

$$\text{Daily Pipeline cost} = \text{OCC rate} * \text{MNEPOR}$$

NTS Optional Capacity rate (p/kWh/day) by application of the following:

$$\text{NTS Optional Capacity rate} = \text{Daily Pipeline cost} / \text{FCC}$$

$$\text{NTS Exit OCC rate} = \text{NTS Optional Capacity rate} / 2$$

$$\text{NTS Entry OCC rate} = \text{NTS Optional Capacity rate} / 2$$



Annual NTS OCC Fee:

$$\text{Annual NTS Optional Capacity Fee} = (\text{FCC} \times \text{NTS Exit OCC Rate} + \text{FCC} \times \text{NTS Entry OCC Rate}) \times 365 - (\sum \text{OCC Entry Charges} + \sum \text{OCC Exit Charges})$$

Where

$\sum$ OCC Entry Charges = sum of all Users OCC Entry Charges for the OCC Route

And

$\sum$ OCC Exit Charges = sum of all Users OCC Exit Charges for the OCC Route

47. 18 of the currently observed routes would qualify for a lower NTS Optional Capacity Charges for entry and exit than the prevailing RPM from the sensitivity model for Gas Year 2019/20, therefore are considered to take the optional capacity charge.

48. These 18 routes are under 30km in straight-line distance and would constitute 60% of the actual flows observed in Gas Year 2017/18

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678H	Optional Charge flow (based on 2017/18 GY) GWh	146,283

Table 12: Optional charge flow 2019/20 assumed, compared to GY 2017/18 actuals

## Revenue

49. Based on the availability of the optional charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.

50. The sensitivity model is run to calculate reference prices under the PS RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts. Optional charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Optional Charges.

51. The Annual NTS OCC Fee is an indicative value of revenue that could be recovered if capacity bookings are below FCC levels at the relevant exit points.

			Entry	Exit
2019/20	678 PS	Total Revenue Recovered (£):	325,638,141	318,084,409
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-12,185,049	-19,738,781
2019/20	678H	Rev from Optional Charge flow @ 678 capacity prices	58,678,619	22,727,494
		Rev from Optional Charge flow @ 678H capacity prices	5,488,720	5,488,720
		Annual OCC Fee	7,814,930	7,814,930
		678H Under Recovery	-45,374,969	-9,423,844

Table 13: Optional charge assumed under recovery

**Prices**

52. This anticipated under recovery of revenue is fed into the adjustment calculation of the Sensitivity Model to demonstrate the indicative impact on prices, given perfect foresight of the flows that qualify for the Optional Charge.

53. The FCC for relevant Exit Points and the corresponding Entry Points are reduced by the flows observed.

	<b>Impact to reference prices</b>	<b>Impact to reserve prices</b>
<b>Entry</b>	<b>+45%</b>	<b>+39%</b>
<b>Exit</b>	<b>+17%</b>	<b>+10%</b>

Table 14: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678H PS RPM 2019/20

54. Non-Transmission Services price increase driven by a reduction in applicable flows, with Optional Charge flows excluded

	<b>678</b>	<b>678H</b>
<b>Non-Tx rate</b>	<b>0.0140</b>	<b>0.0171</b>

Table 15: Non-Transmission Service Charges with 678H Optional Charge flows removed, 2019/20

## **UNC0678I - Amendments to Gas Transmission Charging Regime including Wheeling and an Ireland Security Charge**

**Introduction**

55. From Mod UNC0678I

**Wheeling**

*The proposal will enable National Grid to continue to offer transportation services that result in the efficient use of its gas network. The proposed method is a well-established concept within European gas regulation and will be generated according to the formula outlined below. The Proposer acknowledges that building physical infrastructure to bypass the NTS is a potential consequence of not having a genuine ‘short haul’ product available but other*

*potential consequences exist such as the potential withdrawal of GB Shippers from supply contracts, leading to a loss of market participants and subsequently liquidity in the GB market. Encouraging efficient use of the network facilitates the delivery of gas to the GB market. It also supports the efficient flow of gas across interconnection points. The Wheeling product is beneficial to GB customers as Security of Supply is facilitated.*

### Optional Charge Availability

56. Wheeling Charge Formula:

**Wheeling rate (Wr)p/kWh:**  
**[2086.59 x M <sup>-0.834</sup> x D + 610.70 x M <sup>-0.654</sup>]**

Where:

M = Maximum NTS Exit Point Offtake Rate (MNEPOR) at the site, converted into kWh/day.

^ means 'to the power of'.

**Wheeling charge (Wc) p/kWh/d (Conversion to capacity based charge):**  
**Wc=((Wr x M))/FCC**

57. The Wheeling charge is applicable based on the condition there is 0km distance as outlined in the distance matrix that forms part of the RPM and FCC Methodology.

58. 8 of the currently observed routes would qualify for a lower Wheeling Charges for entry and exit than the prevailing RPM from the sensitivity model for Gas Year 2019/20, therefore are considered to take the optional capacity charge. This would constitute 45% of the actual flows observed in Gas Year 2017/18

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678l	Optional Charge flow (based on 2017/18 GY) GWh	111,631

Table 16: Wheeling charge flow 2019/20 assumed, compared to GY 2017/18 actuals

### Revenue

59. Based on the availability of the Wheeling charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.

60. The sensitivity model is run to calculate reference prices under the CWD RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts.

Wheeling charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Wheeling Charges.

			Entry	Exit
2019/20	678	Total Revenue Recovered (£):	327,187,973	320,717,255
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-10,635,218	-17,105,935
2019/20	678I	Rev from Optional Charge flow @ 678 capacity prices	34,535,608	17,665,740
		Rev from Optional Charge flow @ 678I capacity prices	2,260,910	2,260,910
		678I Under Recovery	-32,274,697	-15,404,830

Table 17: Wheeling charge assumed under recovery

## Prices

61. This anticipated under recovery of revenue is fed into the adjustment calculation of the Sensitivity Model to demonstrate the indicative impact on prices, given perfect foresight of the flows that qualify for the Wheeling Charge.

62. The FCC for relevant Exit Points and the corresponding Entry Points are reduced by the flows observed.

	Impact to reference prices	Impact to reserve prices
Entry	+28 to +31%	+23 to +26%
Exit	+14 to +17%	+9 to +12%

Table 18: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678I CWD RPM 2019/20

63. Non-Transmission Services price increase driven by a reduction in applicable flows, with Wheeling charge flows excluded

	678	678I
Non-Tx rate	0.0140	0.0163

Table 19: Non-Transmission Service Charges with 678I Wheeling Charge flows removed, 2019/20

## UNC0678J - Amendments to Gas Charging Regime (Postage Stamp) including a Cost based Optional Capacity Charge

### Introduction

64. From UNC Mod 678J:

#### NTS Optional Capacity Charge

*This proposal 0678J will introduce a new capacity based charge that discourages inefficient bypass of the NTS. The new NTS Optional Capacity charge is calculated by applying an equation which relates to the cost of providing pipeline capability to support a particular load size and distance travelled from a nominated NTS Entry Point to the particular NTS Exit Point to derive a unit cost in pence per kWh. The resultant cost from the equation is converted into a capacity cost by application of the site specific FCC and MNEPOR. The charge is then apportioned 50:50 between entry and exit and the Users opting to accept the charge commit to making payments equivalent to the cost of booking one year of capacity (at entry and exit) at the FCC level of the qualifying NTS Exit Point. The NTS Optional Capacity charge arrangements will, in the view of the Proposer, encourage greater use of the NTS by way of avoiding inefficient bypass (whether via onshore or offshore gas pipelines) and facilitate the delivery of gas to the GB market. It will also support the efficient flow of gas across all GB interconnection points*

### Optional Charge Availability

65. NTS Optional Capacity Charge Formula

OCC rate formula for 2019/20:

$$\text{OCC (p/kWh)} = [862.64 * (M)^{-0.79} * D + 735.1 * (M)^{-0.7}]$$

D is the direct distance of the site or non-National Grid NTS Pipeline to the elected Entry Terminal as the crow flies.

M is the Maximum NTS Exit Point Offtake Rate (MNEPOR) at the site, converted into kWh/day.

^ means 'to the power of..'

Capacity rate:

Daily pipeline cost (p/day) by application of the following:

$$\text{Daily Pipeline cost} = \text{OCC rate} * \text{MNEPOR}$$

NTS Optional Capacity rate (p/kWh/day) by application of the following:

$$\text{NTS Optional Capacity rate} = \text{Daily Pipeline cost} / \text{FCC}$$

$$\text{NTS Exit OCC rate} = \text{NTS Optional Capacity rate} / 2$$

$$\text{NTS Entry OCC rate} = \text{NTS Optional Capacity rate} / 2$$

Annual NTS OCC Fee:

**Annual NTS Optional Capacity Fee = (FCC x NTS Exit OCC Rate + FCC x NTS Entry OCC Rate) x 365 – (∑OCC Entry Charges + ∑OCC Exit Charges)**

Where

∑OCC Entry Charges = sum of all Users OCC Entry Charges for the OCC Route

And

∑OCC Exit Charges = sum of all Users OCC Exit Charges for the OCC Route

66. 18 of the currently observed routes would qualify for a lower NTS Optional Capacity Charges for entry and exit than the prevailing RPM from the sensitivity model for Gas Year 2019/20, therefore are considered to take the optional capacity charge.
67. These 18 routes are under 30km in straight-line distance and would constitute 60% of the actual flows observed in Gas Year 2017/18

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678J	Optional Charge flow (based on 2017/18 GY) GWh	146,283

Table 20: Optional charge flow 2019/20 assumed, compared to GY 2017/18 actuals

## Revenue

68. Based on the availability of the optional charge, the under recovery of transmission services revenue when compared with 678, is displayed in the table below for Gas Year 2019/20.
69. The sensitivity model is run to calculate reference prices under the PS RPM and determine the initial under recovery assumed from interruptible and storage capacity discounts. Optional charges are only relevant for the applicable quantity (capacity booked and flowed against, along the specified route), so the under recovery is calculated by comparing the difference between that flow at prevailing RPM and Optional Charges.
70. The Annual NTS OCC Fee is an indicative value of revenue that could be recovered if capacity bookings are below FCC levels at the relevant exit points.

			Entry	Exit
2019/20	678 PS	Total Revenue Recovered (£):	325,638,141	318,084,409
		Target Revenue Recovery (£):	337,823,191	337,823,191
		Revenue Input Figure Adjustment (£):	-12,185,049	-19,738,781
2019/20	678J	Rev from Optional Charge flow @ 678 capacity prices	58,678,619	22,727,494
		Rev from Optional Charge flow @ 678J capacity prices	5,488,720	5,488,720
		Annual OCC Fee	7,814,930	7,814,930
		678J Under Recovery	-45,374,969	-9,423,844

Table 21: Optional charge assumed under recovery

**Prices**

71. This anticipated under recovery of revenue is fed into the adjustment calculation of the Sensitivity Model to demonstrate the indicative impact on prices, given perfect foresight of the flows that qualify for the Optional Charge.

72. The FCC for relevant Exit Points and the corresponding Entry Points are reduced by the flows observed.

	<b>Impact to reference prices</b>	<b>Impact to reserve prices</b>
<b>Entry</b>	<b>+45%</b>	<b>+39%</b>
<b>Exit</b>	<b>+17%</b>	<b>+10%</b>

Table 22: Increase in Prevailing Firm Reference and Reserve Prices to account for Optional Charge anticipated under recovery, 678J PS RPM 2019/20

73. Non-Transmission Services price increase driven by a reduction in applicable flows, with optional charge flows excluded

	<b>678</b>	<b>678J</b>
<b>Non-Tx rate</b>	<b>0.0140</b>	<b>0.0171</b>

Table 23: Non-Transmission Service Charges with 678J Optional Charge flows removed, 2019/20

## Additional Analysis Results

74. For all modifications, additional analysis runs have been completed to assess the price impacts for the Gas Year 2020/21, which are presented in the tables below.

<b>678B</b>			<b>Entry</b>	<b>Exit</b>
2020/21	678B	Rev from Optional Charge flow @ 678 capacity prices	80,431,862	40,411,660
		Rev from Optional Charge flow @ 678B capacity prices	18,449,383	8,576,521
		678B Under Recovery	-61,982,480	-31,835,139

2017/18	Actual	Optional Charge flow GWh	244,508
2020/21	678B	Optional Charge flow (based on 2017/18 GY) GWh	244,508

		<b>Impact to reference prices</b>	<b>Impact to reserve prices</b>
<b>678B</b>	<b>Entry</b>	+29%	+24%
	<b>Exit</b>	+14%	+8%
		<b>678</b>	<b>678B</b>
<b>Non-Tx rate</b>		<b>0.0138</b>	<b>0.0202</b>

<b>678D</b>			<b>Entry</b>	<b>Exit</b>
2020/21	678D	OCC flow @ 678 capacity prices	49,644,850	24,062,915
		OCC flow @ 678D capacity prices	5,114,526	5,114,526
		Annual OCC Fee	5,910,973	5,910,973
		678D Under Recovery	-38,619,351	-13,037,416

2017/18	Actual	Optional Charge flow GWh	244,508
2020/21	678D	Optional Charge flow (based on 2017/18 GY) GWh	143,292

		<b>Impact to reference prices</b>	<b>Impact to reserve prices</b>
<b>678D</b>	<b>Entry</b>	+29% to +33%	+24% to +28%
	<b>Exit</b>	+14% to +18%	+9% to +12%
		<b>678</b>	<b>678D</b>
<b>Non-Tx rate</b>		<b>0.0138</b>	<b>0.0169</b>



<b>678G</b>				Entry	Exit
2020/21	678G	OCC flow @ 678 capacity prices		49,644,850	24,062,915
		OCC flow @ 678G capacity prices		5,114,526	5,114,526
		Annual OCC Fee		5,910,973	5,910,973
		678G Under Recovery		<b>-38,619,351</b>	<b>-13,037,416</b>
2017/18	Actual	Optional Charge flow GWh		244,508	
2020/21	678G	Optional Charge flow (based on 2017/18 GY) GWh		143,292	

		Impact to reference prices	Impact to reserve prices
<b>678G</b>	<b>Entry</b>	+29% to +33%	+24% to +28%
	<b>Exit</b>	+14% to +18%	+9% to +12%
		<b>678</b>	<b>678G</b>
<b>Non-Tx rate</b>		<b>0.0138</b>	<b>0.0169</b>

<b>678H</b>				Entry	Exit
2020/21	678H	Rev from Optional Charge flow @ 678 capacity prices		62,748,125	25,165,085
		Rev from Optional Charge flow @ 678H capacity prices		5,500,374	5,500,374
		Annual OCC Fee		609,191	609,191
		678H Under Recovery		<b>-56,638,561</b>	<b>-19,055,521</b>
2017/18	Actual	Optional Charge flow GWh		244,508	
2020/21	678H	Optional Charge flow (based on 2017/18 GY) GWh		146,283	

		Impact to reference prices	Impact to reserve prices
<b>678H</b>	<b>Entry</b>	+45%	+39%
	<b>Exit</b>	+19%	+12%
		<b>678</b>	<b>678H</b>
<b>Non-Tx rate</b>		<b>0.0138</b>	<b>0.0170</b>

<b>678I</b>			Entry	Exit
2020/21	678I	Rev from Optional Charge flow @ 678 capacity prices	37,351,007	19,400,151
		Rev from Optional Charge flow @ 678I capacity prices	2,285,693	2,285,693
		678I Under Recovery	-35,065,314	-17,114,458
2017/18	Actual	Optional Charge flow GWh	244,508	
2020/21	678I	Optional Charge flow (based on 2017/18 GY) GWh	111,631	

		Impact to reference prices	Impact to reserve prices
<b>678I</b>	Entry	+27% to +30%	+22% to +25%
	Exit	+14% to +17%	+9% to +11%

	678	678I
<b>Non-Tx rate</b>	<b>0.0138</b>	<b>0.0161</b>

<b>678J</b>			Entry	Exit
2020/21	678J	Rev from Optional Charge flow @ 678 capacity prices	62,748,125	25,165,085
		Rev from Optional Charge flow @ 678J capacity prices	5,500,374	5,500,374
		Annual OCC Fee	609,191	609,191
		678J Under Recovery	-56,638,561	-19,055,521

2017/18	Actual	Optional Charge flow GWh	244,508
2020/21	678J	Optional Charge flow (based on 2017/18 GY) GWh	146,283

		Impact to reference prices	Impact to reserve prices
<b>678J</b>	Entry	+45%	+39%
	Exit	+19%	+12%

	678	678J
<b>Non-Tx rate</b>	<b>0.0138</b>	<b>0.0170</b>

Tables 24-41: Modification 0678 B/D/G/H/I/J 2020/21 - Under Recovery and Optional Charge/Wheeling flow – Impact to reference and reserve prices, impact to non-Transmission Prices

75. For all modifications, in order to illustrate how the price impacts for the optional charges are influenced by the Existing Contracts, and therefore provide some indication on the price impacts once these cease to exist, the UNC0678 V3.1 CWD Transmission Services - Sensitivity Model has been run for Gas Year 2019/20 with all existing contract numbers removed. Non-Transmission Services results remain unchanged and therefore are not represented here.

These results are presented in the tables below.

<b>678B</b>			Entry	Exit
2019/20	678B	Rev from Optional Charge flow @ 678 capacity prices	35,764,480	36,252,699
		Rev from Optional Charge flow @ 678B capacity prices	8,150,102	7,554,735
		678B Under Recovery	-27,614,378	-28,697,965

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678B	Optional Charge flow (based on 2017/18 GY) GWh	244,508

		Impact to reference prices	Impact to reserve prices
<b>678B</b>	Entry	+23%	+9%
	Exit	+15%	+9%

<b>678D</b>			Entry	Exit
2019/20	678D	OCC flow @ 678 capacity prices	22,031,045	21,469,361
		OCC flow @ 678D capacity prices	5,102,872	5,102,872
		Annual OCC Fee	5,928,056	5,928,056
		678D Under Recovery	-11,000,117	-10,438,433

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678D	Optional Charge flow (based on 2017/18 GY) GWh	143,292

		Impact to reference prices	Impact to reserve prices
<b>678D</b>	Entry	+22% to +26%	+8% to +12%
	Exit	+14% to +18%	+8% to +12%

<b>678G</b>			Entry	Exit
2019/20	678G	OCC flow @ 678 capacity prices	22,031,045	21,469,361
		OCC flow @ 678G capacity prices	5,102,872	5,102,872
		Annual OCC Fee	5,928,056	5,928,056
		678G Under Recovery	-11,000,117	-10,438,433

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678G	Optional Charge flow (based on 2017/18 GY) GWh	143,292

		Impact to reference prices	Impact to reserve prices
<b>678G</b>	Entry	+22% to +26%	+8% to +12%
	Exit	+14% to +18%	+8% to +12%

<b>678H</b>				Entry	Exit
2019/20	678H	Rev from Optional Charge flow @ 678 capacity prices		25,034,469	22,624,401
		Rev from Optional Charge flow @ 678H capacity prices		5,488,720	5,488,720
		Annual OCC Fee		7,814,930	7,814,930
		678H Under Recovery		-11,730,819	-9,320,751

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678H	Optional Charge flow (based on 2017/18 GY) GWh	146,283

		Impact to reference prices	Impact to reserve prices
<b>678H</b>	Entry	+30%	+12%
	Exit	+17%	+10%

<b>678I</b>				Entry	Exit
2019/20	678I	Rev from Optional Charge flow @ 678 capacity prices		16,587,115	17,576,443
		Rev from Optional Charge flow @ 678I capacity prices		2,260,910	2,260,910
		678I Under Recovery		-14,326,204	-15,315,532

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678I	Optional Charge flow (based on 2017/18 GY) GWh	111,631

		Impact to reference prices	Impact to reserve prices
<b>678I</b>	Entry	+21% to +25%	+8% to +11%
	Exit	+14% to +17%	+8% to +11%

<b>678J</b>				Entry	Exit
2019/20	678J	Rev from Optional Charge flow @ 678 capacity prices		25,034,469	22,624,401
		Rev from Optional Charge flow @ 678J capacity prices		5,488,720	5,488,720
		Annual OCC Fee		7,814,930	7,814,930
		678J Under Recovery		-11,730,819	-9,320,751

2017/18	Actual	Optional Charge flow GWh	244,508
2019/20	678J	Optional Charge flow (based on 2017/18 GY) GWh	146,283

		Impact to reference prices	Impact to reserve prices
<b>678J</b>	Entry	+30%	+12%
	Exit	+17%	+10%

Tables 42-53: Modification 0678 B/D/G/H/I/J, 2019/20 Removed Existing Contracts - under recovery and optional charge/wheeling flow – Impact to reference and reserve prices