Illustration of UR entry tariff process set out in 'Consultation on the introduction of entry charges into the Northern Ireland postalised regime for gas'

27 October 2014



Illustrative worked example

1.1. This paper provides a worked example to illustrate the proposals set out in the ***Consultation Paper*** ***on the introduction of entry charges into the Northern Ireland postalised regime for gas*** published on 16th October 2014. The worked example has been calculated using the separate Excel tariff model published alongside this paper. Where appropriate we have presented some of the key calculations below and highlighted the relevant tariff calculations in the model.

1.2. It should be noted that the model and worked example illustrates the proposals contained in the consultation paper on the introduction of entry charges only. Therefore, both are subject to change and do not provide any indication as to future tariffs. It merely illustrates the proposed process in the consultation paper referenced above.

I. Calculation of the reference price and auction reserve prices

STEP 1: Collect shipper information and set tariff parameters

1.3. The assumptions taken in this calculation which correspond with the tariff parameters set out in STEP 1 are set out in Table 1 below.

1.4. To replicate the provision of shipper information we have developed a simple scenario with illustrative forecast capacity bookings and commodity flows. The scenario assumes three transmission system operators representing the TSOs: BGE(UK), BGTL and PTL and three shippers consisting of a single large non-power shipper representing the non-power sector (shipper 1 in the model) and the two power stations (shipper 2 and shipper 4 in the model).

1.5. For ease of demonstrating the proposed tariff process and the key calculations associated with it we have assumed that shippers only use annual and quarterly capacity products at entry and the annual capacity product at exit. Otherwise by including monthly and daily capacity products the calculations become too cumbersome to present as a worked example. The data set used for the worked example is presented in Appendix 1 of this paper.

1.6. Also for ease of demonstration the seasonal factors have been simplified so that the seasonal factor is the same for each month in a quarter.

1.7. The TSOs' forecast required revenues presented in the table below have been taken from those submitted under the 2012-13 postalised calculation. In the model, this data is presented in the "INPUT¦UR" and "INPUT¦Vols" worksheets.

Table 1: Illustrative shipper and TSO data and tariff input settings

Description	**Assumption taken**	
Capacity Commodity Split	Capacity 75%	Commodity 25%
TSO individual forecast required revenue	PTL: £20,162,771 BGE: £18,263,239 BGTL: £7,040,850	
TSOs' total forecast required revenue	£45,466,860	
Total forecast commodity volumes	16,077,975,847kwh	

Seasonal factors											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.00	1.00	1.00	1.50	1.50	1.50	1.25	1.25	1.25	1.00	1.00	1.00

Price Multipliers for short term entry products
Annual: 1; Quarterly : 1.1

Number of days per quarter			
Q1	Q2	Q3	Q4
92	90	91	92

STEP 2: calculate the annual firm capacity entry/exit tariffs and entry/exit commodity tariff

1.8. Firstly revenues are allocated to capacity and commodity products as shown in Table 2. This calculation is presented in the "CALC¦Revalloc" worksheet of the model.

Table 2: Revenue allocated to capacity and commodity products

Revenue allocated to capacity products	
£45,466,860 x 75% =	£34,100,145
Revenue allocated to commodity products	
£45,466,860x 25% =	£11,366,715

1.9. Then the annual firm commodity tariffs and capacity tariffs are determined as below in Table 3. These calculations are contained in the "CALC¦Com" and "CALC¦Cap" worksheets of the model.

Table 3: Calculation of annual capacity and commodity tariff

Description	Formulae	Calculation	Forecast Tariff
Forecast Annual capacity tariff	= revenue to be collected via capacity charge/weighted forecast capacity bookings at entry and exit	£34,100,145/152,674,498 peak day kwh	£0.22335 per kwh/peak day
Commodity tariff	= revenue to be collected via commodity charge/total forecast commodity	£11,366,715/16,077,975,847	£0.000707 /kwh

1.10. The forecast annual capacity tariff calculated above is applied to the two entry points (Gormanston and Moffat) and also to the exit so that the tariffs are equal - see STEP 3 below.

1.11. The formulae and figures used to calculate the weighted forecast capacity booking figure of 152,674,498 /peak day kwh (above) are presented in Appendix 2. This is calculated in highlighted cell G227 of the "CALC¦Cap" sheet.

STEP 3: Calculate the reserve prices for short term entry capacity products

1.12. The annual firm entry tariff is used to calculate the reserve price for the short term entry capacity products together with the relevant seasonal factor, multipliers and time factors. These calculations are contained in the "CALC¦Cap" worksheet of the model. As noted above the reserve prices are the same for Moffat and for Gormanston. Since this worked example only has a quarterly capacity product we have applied the formula set out in STEP 3 above to determine the quarterly entry capacity product reserve price:

$$P_{st} = M \times (P_y / 365) \times D \times S_m$$

Table 4: Calculation of the quarterly reserve price

Quarterly Reserve Price		
Description	**Calculation**	**Reserve Price**
Reserve price for quarterly product Q1	1.1 x (0.22335/365) x 92 x 1.0	£0.06193 peak day kwh
Reserve price for quarterly product Q2	1.1 x (0.22335/365)x 90 x 1.5	0.09087 peak day kwh
Reserve price for quarterly product Q3	1.1 x (0.22335/365) x 91 x 1.25	£0.07657 peak day kwh
Reserve price for quarterly product Q4	1.1 x (0.22335/365) x 92 x 1.0	£0.06193 peak day kwh

1.13. The number of days in each quarter varies from 90-92, hence the difference in days corresponding to the D variable. It will also be necessary to take into account the 29th day in February when the gas

year includes that part of a leap year, as in 2015/16 and 2019/20.

II. Capacity auctions and invoice payment cycle

1.14. The figures calculated above are used to provide the reserve prices for the quarterly auctions. To demonstrate the invoicing payments we have assumed a forecast portfolio for the Large Shipper for the first quarter as set out in table 5 below. We have assumed that there is no auction premium in any of the quarterly capacity auctions and that the shipper only books capacity at Moffat, not at Gormanston.

Table 5: Illustrative Large Shipper data for quarter 1.

Illustrative Shipper Data	
Annual Capacity Booked at Entry	25,000,000 kwh/day
Quarter 1 Capacity Booked	4,000,000 kwh/day
Annual Capacity Booked at Exit	30,485,703 kwh/day
Commodity flowed October	470,581,000 kwh
Commodity flowed November	568,334,000 kwh
Commodity flowed December	630,880,000 kwh

1.15. The data in the Table above is contained in the "INPUT¦Vols" worksheet of the model.

Table 6: Illustrative Shipper Invoice

Illustrative Shipper Invoice	
Entry Annual Capacity charge October = 25,000,000/12 x 0. 22335 =	£465,312
Entry Annual Capacity charge November = 25,000,000/12 x 0. 22335 =	£465,312
Entry Annual Capacity charge December = 25,000,000/12 x 0. 22335 =	£465,312
Entry Quarterly capacity charge, Quarter 1 = 4,000,000 x 0. 06193 =	£247,720
Exit Annual Capacity charge October = 30,485,703/12 x 0. 22335 =	£ 567,415
Exit Annual Capacity charge November = 30,485,703/12 x 0. 22335 =	£ 567,415
Exit Annual Capacity charge December = 30,485,703/12 x 0. 22335 =	£ 567,415

Exit Commodity charge October = 470,581,000 x 0.0003535 =	£332,689
Exit Commodity charge November = 568,334,000x 0.0003535 =	£401,798
Exit Commodity charge December = 630,880,000 x 0.0003535 =	£446,016
Total Large Shipper bill for Quarter 1 (excluding VAT) =	£4,526,405

1.16. The calculations in table 6 above are contained in the "CALC¦ShipInv" worksheet of the model.

1.17. For the same period the payments from the power stations are £3,739,847 and £3,052,899 respectively (calculations not shown - figures taken from tariff model). The total payment due to the TSOs for this quarter is therefore £11,319,151. The distribution of payments to the TSOs is based upon their share of their total required revenues. The total of £11,319,151 is allocated as follows:

Table 7:TSO reconciliation allocation

TSO	Calculation	Revenue Allocation
BGE	(£18,263,239/£45,466,860) x £11,319,151	£4,546,704
PTL	(£20,162,771/£45,466,860) x £11,319,151	£5,019,600
BGTL	(£7,040,850/£45,466,860) x £11,319,151	£1,752,846

1.18. This calculation is found in rows 120-122 of the "CALC¦Dist" worksheet of the model. All of the figures above exclude VAT. We have calculated a quarterly invoice payment for ease of demonstration. We expect that in practice that the shipper invoices will be distributed on a monthly basis.

1.19. If at an auction the clearing price were higher than the reserve price the shipper would pay the clearing price in their invoice. So in the example above if the auction for quarter 1 capacity product raised the reserve price from 0.06193 kwh/peak day to a clearing price of 0.07000 kwh/peak day

the quarterly capacity charge for quarter 1 would be 4,000,000 x 0.07000 = £280,000.

III. End of year reconciliation

1.20. Over the course of the year the actual commodity flowed and actual capacity booked for each of the short term capacity products and forecast required revenues may differ from those forecast prior to the start of the gas year. In addition, the TSOs may over recover their revenue allowances if auction prices are higher than reserve prices.

1.21. For the calculations below we have assumed that only the fourth quarterly capacity bookings differ from forecast. This will change the annual year end capacity tariff and year end quarterly capacity tariff. The actual commodity bookings are those recorded in the 12/13 gas year.

1.22. The modelling provides the year end tariffs set out in table 8 below. The forecast tariffs are provided for comparison.

1.23. We have not demonstrated the calculations for the year-end tariffs as they follow the same process as that used to determine the forecast tariffs but with the actual volumes substituted for the forecast volumes where appropriate.

Table 8: Summary table of Forecast and Year- End Tariffs

FORECAST			
Entry capacity - annual	£/peak day kWh		0.22335
Entry capacity - quarterly	£/peak day kWh	Q1	0.06193
		Q2	0.090870
		Q3	0.076570

		Q4	0.06193
Exit commodity	£/kWh		0.000707
Exit capacity - annual	£/peak day kWh		0. 22335
YEAR END			
Entry capacity - annual	£/peak day kWh		0.22254
Entry capacity - quarterly	£/peak day kWh	Q1	0.06170
		Q2	0.09054
		Q3	0.07629
		Q4	0.06170
Exit commodity	£/kWh		0.0007802
Exit capacity - annual	£/peak day kWh		0.22254

1.24. The model has calculated the end of year reconciliation payments by product by shipper. The figures are set out in table 9 below and can be found in the CALC¦REC

Table 9: Reconciliation by product by shipper

RECONCILIATION BY PRODUCT BY SHIPPER	ENTRY CAPACITY - ANNUAL	ENTRY CAPACITY - QUARTERLY	EXIT COMMODITY	EXIT CAPACITY	Total By Shipper
Shipper 1	£20,250	£3,590	-£411,033	£24,693	**-£362,500**
Shipper 2	£16,200	£5,350	-£269,295	£23,739	**-£224,007**
Shipper 4	£15,200	£0	-£386,189	£15,200	**-£355,788**
TOTAL	**£51,650**	**£8,940**	**-£1,066,517**	**£63,633**	**-£942,294**

1.25. The calculations to derive the reconciliations for the Large Shipper are set out below. The Large Shipper flowed 5,615,204,000 kwh over the year.

Entry Capacity Annual Reconciliation Payment =
(Forecast annual entry capacity tariff – Year end annual entry capacity tariff) x total annual entry capacity booked =(0.22335-0.22254) x 25,000,000 = £20,250

Entry Capacity Quarterly Reconciliation Payment = (Forecast quarterly

capacity tariff Q1 – year end entry capacity tariff) x (total quarterly bookings for Q1) + (Forecast quarterly capacity tariff Q2– year end entry capacity tariff) x (total quarterly bookings for Q2) + (Forecast quarterly capacity tariff Q3– year end entry capacity tariff) x (total quarterly bookings for Q3) + (Forecast quarterly capacity tariff Q4 – year end entry capacity tariff) x (total quarterly bookings for Q4) =

= (0.06193-0.0617) x 4,000,000 + (0.090870-0.09054) x 5,000,000 + (0.07657-0.07629) x 2,000,000 + (0.06193 – 0.0617) x 2,000,000 = £3,590

Exit Commodity Reconciliation Payment =
(Forecast exit commodity tariff – Year end exit commodity tariff) x total volumes flowed
= (0.000707-0.0007802) x 5,615,204,000 = -£411,033

Exit Capacity Reconciliation payment = (Forecast annual exit capacity tariff – Year end annual exit capacity tariff) x total annual exit capacity booked =(0.22335-0.22254) x 30,485,703 = £24,693

Total reconciliation payment for Large Shipper = £20,250 + £3,590 - £411,033 +£24,693 = -£362,500

1.26. A positive figure denotes that the shipper has overpaid in the year and is due a rebate from the TSOs, whereas a negative denotes that the shipper has underpaid and is required to pay the TSOs. The total figure of -£362,500 above denotes that the Large Shipper has underpaid and is required to pay the TSOs. We propose that the current arrangement of a bullet payment to settle the reconciliation amounts continues once entry charges are introduced.

1.27. In the calculations above, the capacity reconciliation payments for both annual and quarterly entry products are positive i.e. the shippers are due a rebate from the TSOs. This is because more capacity was used in the year than was forecast (the worked example increased the quarter 4

capacity bookings for the Large Shipper). This resulted in the year end annual entry capacity and subsequently the quarterly capacity figures being lower than those forecast. Hence the shippers overpaid throughout the year.

1.28. Whereas the commodity elements of the reconciliation payments above are negative because less gas flowed than forecast. This resulted in a higher year end entry and exit commodity tariffs compared to forecast commodity tariffs. Therefore over the course of the year there was an underpayment from shippers. This is reflected in the commodity reconciliation figures.

1.29. The TSOs' distribution of the reconciliation payments are based upon their share of the total required revenues. So for example the total reconciliation figure of -£942,294 is allocated as follows in Table 10.

Table 10: Calculation of TSO's portion of reconciliation

TSO	Calculation	Portion of reconciliation
BGE	(£18,263,239/£45,466,860) x -£942,294	-£378,503
PTL	(£20,162,771/£45,466,860) x -£942,294	-£417,870
BGTL	(£7,040,850/£45,466,860) x -£942,294	-£145,921

1.30. As noted in the consultation paper, we propose that the revenue split is determined as an output of the tariff process. The revenue split for capacity under the worked example set out above is: Entry 48.73% and Exit 51.27%.

Appendix 1: Worked example data

Description	Assumption taken
Capacity Commodity Split	Capacity 75% Commodity 25%
TSO individual forecast required revenue	PTL: £20,162,771 BGE: £18,263,239 BGTL: £7,040,850
TSOs' total forecast required revenue	£45,466,860
Total forecast commodity volumes	16,077,975,847 kwh
Actual forecast commodity volumes	14,569,901,000 kwh

Seasonal factors											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.00	1.00	1.00	1.50	1.50	1.50	1.25	1.25	1.25	1.00	1.00	1.00

Price Multipliers for short term products
Annual: 1; Quarterly : 1.1

Number of days per quarter			
Q1	Q2	Q3	Q4
92	90	91	92

Forecast Entry Capacity Booking (peak kwh/day)					
Large Shipper 1		Power Station Shipper 2		Power Station Shipper 4	
Annual	25,000,000	Annual	20,000,000	Annual	18,766,000
Q1	4,000,000	Q1	5,000,000	Q1	0
Q2	5,000,000	Q2	5,000,000	Q2	0
Q3	2,000,000	Q3	5,000,000	Q3	0
Q4	0	Q4	5,000,000	Q4	0
Actual Entry Capacity Booking (peak kwh/day)					
Large Shipper 1	Large Shipper 1	Large Shipper 1	Large Shipper 1	Large Shipper 1	Large Shipper 1
Annual	25,000,000	Annual	20,000,000	Annual	18,766,000
Q1	4,000,000	Q1	5,000,000	Q1	0
Q2	5,000,000	Q2	5,000,000	Q2	0
Q3	2,000,000	Q3	5,000,000	Q3	0
Q4	2,000,000	Q4	5,000,000	Q4	0
Forecast Exit Capacity Booking (peak kwh/day)					
Large Shipper 1		Power Station Shipper 2		Power Station Shipper 4	
Annual	30,485,703	Annual	29,307,000	Annual	18,766,000
Actual Exit Capacity Booking (peak kwh/day)					
Annual	30,485,703	Annual	29,307,000	Annual	18,766,000

Appendix 2: weighted forecast capacity booking calculation

The weighted forecast entry capacity booking = (total forecast annual capacity booking for all shippers)
+
(total forecast quarterly booking for quarter 1 x quarterly time factor x quarterly price multiplier x Q1 seasonal factor)
+
(total forecast quarterly booking for quarter 2 x quarterly time factor x quarterly price multiplier x Q2 seasonal factor)
+
(total forecast quarterly booking for quarter 3 x quarterly time factor x quarterly price multiplier x Q3 seasonal factor)
+
(total forecast quarterly booking for quarter 4 x quarterly time factor x quarterly price multiplier x Q4 seasonal factor)

+ (total forecast exit capacity booking)

The quarterly time factor is the number of days in the quarter divided by the number of days in the year.

Substituting the data from the above tables:

The weighted forecast capacity booking =

(25,000,000 +20,000,000 + 18,766,000)

+ (4,000,000+5,000,000) x 92/365 x1.1 x 1

+ (5,000,000+5,000,000) x 90/365 x1.1 x 1.5

+ (2,000,000+5,000,000) x 91/365 x1.1 x 1.25

+ (5,000,000) x 92/365 x1.1 x 1

+(30,485,703 + 29,307,000 + 18,766,000)

= 152,674,498