MODIFICATION PROPOSAL 0606
Reform of the cash-out arrangements and the inclusion of costs of OM gas used for end of day balancing purposes using a stack process

BUSINESS RULES

1 Introduction

Modification Proposal 0606, “Reform of the cash out arrangements and the inclusion of costs of OM gas used for end of day balancing purposes using a stack process”, has been raised by AEP Energy Services Ltd.

The Proposal is designed to improve cost reflectivity in imbalance charges and provide improved incentives for shippers to balance by ensuring that the costs of using OM gas are better reflected within the derivation of cash out prices when OM gas is used for end of day balancing purposes.

The Proposal will not alter the current OM cost recovery mechanism. If OM gas is used for end of day balancing purposes, however, additional revenue will flow into balancing neutrality on that day. For shippers who are in balance, this additional revenue will partially offset existing cost recovery mechanisms (that are commodity based). The existing charges are set out below.

OM costs will continue to be recovered from Users by the existing cost recovery mechanisms:

- Storage capacity costs are recovered via the SO commodity charge.
- Some gas and utilisation costs via the Daily Margins Recovery Amount used in the determination of Balancing Neutrality Charges under Section F of the Network Code; and
- Any remaining costs incurred after unused OM gas is disposed of at the end of the storage year are recovered via the Closing Margins Adjustment Charge.

This modification (and the related modification number 0607) has been raised following discussions in Workstream meetings and the development of business rules for modification proposal 575, “Revisions to cash out pricing and the methodology for recovery of OM costs”.

The two modifications represent two distinct approaches, arising from the Modification Proposal 0575 development process. Modification Proposal 0575 proposed that a full cost attribution model be applied to any OM gas utilisation (reflecting storage space, gas, injection and withdrawal costs) and be used to derive a unit cost that might feed into the cash out price determination process where Transco has used OM gas for end of day balancing purposes.

Following Workstream discussions, it was agreed that the development process had led to two approaches that were sufficiently different from the original proposal to merit consideration as two separate Modification Proposals.

The intent of the proposal is to expose Users to more cost reflective cash-out prices if shippers are out of balance and Transco has had to use OM gas for end of day balancing purposes. The Proposer notes that currently the treatment of OM may give rise to artificially dampened cash-out prices where Transco uses OM gas for end of day gas balancing purposes. A declared aim of the Proposal is that implementation would send stronger signals to Users of the value of storage and flexible gas supplies and demand management. Whilst the Proposal does not change the current direct apportionment of OM costs the Proposer considers that the cash-out regime changes will enhance regime operation, specifically this may promote more robust gas supplies as an indirect effect of better cost reflectivity in cash out charges..

The following business rules have been prepared following debate in the NT&T Workstream. The approach derives an OM utilisation rate based on the costs of OM and is defined as a unit rate per kWh of relevant OM usage. The rules then define how such a price might influence the derivation of cash-out prices.

The approach defined within these rules is designed so that any OM action (regardless of the reason for OM use) may influence the cash-out price derivation. Where in aggregate the community have not put in enough gas then the SMP buy price will be set at the relevant point in an ordered net stack of system buy actions as compared with the Net System Imbalance (NSI). The resulting SMP buy price may not necessarily be the most expensive buy action on the day but will deliver a more cost reflective cash-out price than the existing rules. An analogous approach is used where the community is “long” involving the NSI and the net stack of system sell actions.

2 Concepts/Definitions

Exercise Cost – A unit charge derived taking account of the costs associated with Operating Margins gas use on the day (p/kWh).

Net System Imbalance - the difference between relevant Users' aggregate daily inputs, including unclaimed gas, and relevant Users' aggregate daily offtakes, less the net of any volumes sold to Transco minus any volumes bought from Transco as system operator (kWh). "Relevant User" means any User other than the Shrinkage Provider, the Top-up Manager and Transco when acting for Operating Margins Purposes.

Option Cost - A unit charge derived taking account of the costs associated with the provision of the Operating Margins gas service but not associated with use on a day (p/kWh).

Required Deliverability - Storage Deliverability identified as being required over the course of a storage year for Operating Margins purposes (kWh/day) published on or before the 1st March preceding the start of the Storage Year.

Storage Deliverability Charge - is a charge (p/kWh/day) in respect of, and determined by reference to the amount of, Transco's Registered Storage Deliverability in a Storage Facility for Operating Margins purposes.

Storage Space - is Transco's Registered Storage Space capacity (in kWh) that entitles Transco to hold that quantity of gas in storage in a Storage Facility for Operating Margins purposes.

Storage Space Charge - is the charge (p/kWh) in respect of, and determined by reference to the amount of, Transco's Registered Storage Space in a Storage Facility.

Storage Withdrawal Charge - charges in respect of quantities withdrawn from each Storage Facility for Operating Margins purposes at the rate (in pence per kWh/day) specified in the Annual Storage Invitation in respect of such facility for the month in which such quantities are withdrawn.

System Average Price (SAP) - as defined in Section F1.2.1 (iii) of the Network Code (and subject to default and exclusions) but essentially the price (in kWh) for a Day calculated as the sum of all Market Transactions Charges divided by the sum of the Trade Nomination Quantities for all Market Transactions effected in respect of that Day.

Transco Annual Storage Costs - the Storage Space Charge multiplied by the Storage Space identified as required for Operating margins purposes.

3 Derivation of an OM Unit Charge Rate

3.1 Any use of Operating Margins gas will be deemed to be a Market Balancing Trade. This would not require any determination by Transco as to whether the OM utilisation was for energy (end-of-day) or system (within-day) balancing.

3.2 After Operating Margins gas has been nominated Transco will notify the community in a timely fashion of such usage. Sufficient information will be provided to enable Users to establish the unit price(s) that might contribute to the cash-out determination process.

3.3 The Operating Margins unit rate price will be the sum of two components; the Exercise Cost and the Option Cost, both determined in p/kWh.

3.4 The Option Cost will reflect the costs incurred by Transco associated with the provision of the Operating Margins service. This will cover costs not directly attributable to utilisation. The Exercise Cost will reflect the costs that are incurred on a day when Operating margins gas is used.

3.5 The Exercise Cost and the Option Cost will be determined on a national average basis.

3.6 These rules define the basis for site-specific price determination, which are then used to calculate a National average price using appropriate weightings.

3.7 The Option Cost (OC) will be made up of the following cost components associated with OM at each site (i):

- Total Storage Space Costs ($TSSC_i$) at site i (p)
- Total Storage Deliverability Costs ($TSDC_i$) at site i (p)
- Total Storage Injection Costs ($TSIC_i$) at site i (p)
- Total Storage booking financing costs ($TSFC_i$) at site i (p)

$TSC_i = TSSC_i + TSDC_i + TSIC_i + TSFC_i$

$OC_i = TSC_i / TSS_i$

where,

OC_i = OM Option Cost (expressed in p/kWh) at site i
TSC_i = Total OM Storage Cost (financial) at site i
TSS_i = The Required Space (kWh) is the maximum Space required for OM purposes at the specific site (i) on all days in the Storage Year.

For each LNG site the methodology will be based on the published Licence Special Condition 9 (d) prices as follows:

$TSSC_i$ = Space requirement (kWh) * Space unit rate charge (p/kWh)
$TSDC_i$ = Max Deliverability requirement (kWh/day) * Deliverability unit rate (p/kWh/day)
$TSIC_i$ = Space requirement (kWh)* published injection cost (p/kWh)
$TSFC_i$ = 6.25% of ($TSSC_i + TSDC_i + TSIC_i$) (p)

For Rough and Hornsea (or any other non Transco LNG storage site) prices will be based on the weighted average auction prices if available. Transco will derive prices based on its assessment of the market value of each storage service procured for OM usage and with “unbundled cost elements” apportioned at Transco’s discretion.

Where, for any reason no component charge cost element or value is available to enable the derivation of any other EC_i or OC_i then Transco shall estimate such component before applying the relevant formula.

3.8 The Exercise Cost (EC_i) at site i in p/kWh) will be made up of the following components:

- The Gas Cost = SAP on the day (p/kWh)
- Storage Withdrawal Charge (SWC_i) at site i (p/kWh)
- System Entry Capacity Charge at relevant entry point (SEC_i) at site i (p/kWh)

The System Entry Charge shall be UCA (p/kWh) for the System Entry Point.

$$EC_i = SAP + SWC_i + SEC_i$$

3.9 Sum total of Option Cost (OC_i) and Exercise Cost (EC_i) to gain Operating Margins cost defined as the OM Unit Rate ($OMUR_i$) for each location i.

$$OMUR_i = OC_i + EC_i$$

3.10 A single option and exercise price will be calculated from the total costs and deliverabilities of all sites where an Operating Margins service is held. The following defines the weighting factors that would apply to each site for both the option price and the exercise price derivation.

$$WA\_OMUR = WA\_OC + WA\_EC$$
$$WA\_OC = \Sigma_i (TSS_i * OC_i) / \Sigma_i (TSS_i)$$
$$WA\_EC = \Sigma_i (TSS_i * EC_i) / \Sigma_i (TSS_i)$$

Where,

WA_OC = Weighted Average OM Option Cost (p/kWh)
WA_EC = Weighted Average OM Exercise Cost (p/kWh)
WA_OMUR = Weighted Average OM Unit Rate (p/kWh)
EC_i = OM Exercise Cost (p/kWh) at site i
OC_i = OM Option Cost (p/kWh) at site i
TSS_i = The Required Space (kWh) is the maximum Space required for OM purposes at the specific site (i) on all days in the Storage Year .

3.11 Transco will publish the national average Operating Margins unit rate figure (less SAP) as soon as the data is available.

4 Determining the Volume of OM Actions: Ex-Post assessment based on Net System Imbalance.

4.1 A unit rate in pence/kWh will be calculated and applied to the volume of Operating Margins gas. Thus a weighted average "National" OM unit rate shall contribute (where appropriate) to the cash-out price determination process.

4.2 After Operating Margins gas has been nominated Transco will notify the community in a timely fashion of such usage where the usage is associated with end of day balancing. Sufficient information will be provided to enable Users to establish the unit price(s) that might contribute to the cash-out determination process.

4.3 All of Transco's Market Balancing Trades on the Gas Day (including any OM volumes and any Primary or Secondary Excluded Actions) are sorted in price order and stacked to create a buy stack and a sell stack.

Firstly consider the stack associated with System Buy transactions where:

$BAP_{buy,i}$ = the balancing action price associated with buy trade i.
$BAQ_{buy,i}$ = the balancing action quantity associated with buy trade i.
N = the number of trades where N is >= 1

Such that [$BAP_{buy,1} \leq BAP_{buy,2} \leq \ldots \leq BAP_{buy,N}$]

Effectively defining a stack that can be visualised as

$BAP_{buy,N}$	$BAQ_{buy,N}$
~	~
$BAP_{buy,2}$	$BAQ_{buy,2}$
$BAP_{buy,1}$	$BAQ_{buy,1}$

With rising prices as progress made up the stack.

(If no buy trades have been transacted then could regard the stack as a single pair with $BAQ_{buy,1}$ = 0)

Secondly consider the stack associated with System Sell transactions where:

$BAP_{sell,i}$ = the balancing action price associated with sell trade i.
$BAQ_{sell,i}$ = the balancing action quantity associated with sell trade i.
M = the number of trades where M is >= 1

Such that $[BAP_{sell,1} \geq BAP_{sell,2} \geq \ldots \geq BAP_{sell,M}]$

$BAP_{sell,M}$	$BAQ_{sell,M}$
~	~
$BAP_{sell,2}$	$BAQ_{sell,2}$
$BAP_{sell,1}$	$BAQ_{sell,1}$

Where prices fall as progress is made up the stack.

If on a Day actions are only taken in one direction then the relevant stack as defined above will define the "Net System Buy" or "Net System Sell" stack for the purposes of cash-out determination.

Where actions are taken on both sides of the market the intent of the matching process that follows is to "match" the most expensive System Buys against the least expensive System Sells, matching part of a Market Balancing Trade on either the Buy or Sell side may be necessary to derive the residual "Net System Buy" or "Net System Sell" stack.

4.4 If the buy stack is of greater volume than the sell stack the highest cost buy actions, equivalent in volume to the sell stack, will be removed from the original buy stack. If an exact number of buy actions do not match the volume of the sell stack a proportion of one trade will be removed from the buy stack so that a volume of "buys" that exactly matches the quantity associated with the total quantity of System Sells is removed. Thus the process will produce a net buy stack associated with the lowest price accepted buy transactions. Algebraically this can be formulated as follows:

Let System Sell Volume, SV = $\sum_{i=1,2,..M} BAQ_{sell,i}$, and

System Buy Volume, BV = $\sum_{i=1,2,...N} BAQ_{buy,i}$

Then derive the

Net Buy Volume, NBV = BV – SV

Given that the Proposal is to match highest priced Buy Volumes with the System Sells (if any) then the Net Buy Back will start with either part or all of the first (lowest price) action of the Buy Back stack ($BAP_{buy,1}$, $BAQ_{buy,1}$)

Then the Net Buy Bid Stack will be defined as follows:

IF $BAQ_{buy,1} > NBV$

THEN $NBAQ_{buy,1} = NBV$, $NBAP_{buy,1} = BAP_{buy,1}$

ELSE FOR X=1..N

IF $\sum_{i=1,...x} BAQ_{buy,i} > NBV > \sum_{i=1,...x-1} BAQ_{buy,i}$

THEN $NBAQ_{buy,x} = NBV - \sum_{i=1,..x-1} BAQ_{buy,i}$ $NBAP_{buy,x}=BAP_{buy,x}$

FOR j=1..X-1

$NBAQ_{buy,j} = BAQ_{buy,j}$ $NBAP_{buy,j}=BAP_{buy,j}$

Where NBAQ and NBAP denote the quantities and prices respectively associated with the "net stack".

4.5 If the sell stack is of greater volume than the buy stack the lowest cost sell actions, equivalent in volume to the buy stack, will be netted off to create a net sell stack. A similar algebraic formulation to achieve the desired result would be:

Using previous rotation then derive the

Net Sell Volume $NSV = SV - BV$

IF $BAQ_{sell,1} > NBV$

THEN $NBAQ_{sell,1} = NBV$, $NBAP_{sell,1} = BAP_{sell,1}$

ELSE FOR X=1..N

IF $\sum_{i=1,\ldots x} BAQ_{sell,i} > NBV > \sum_{i=1,\ldots x-1} BAQ_{sell,i}$

THEN $NBAQ_{sell,x} = NBV - \sum_{i=1,..x-1} BAQ_{sell,i}$ $NBAP_{sell,x}=BAP_{sell,x}$

FOR j=1..X-1

$NBAQ_{sell,j} = BAQ_{sell,j}$ $NBAP_{sell,j}=BAP_{sell,j}$

4.6 All volumes netted off from the buy and sell stacks in the processes defined in 4.4 and 4.5 will be deemed to be actions taken for within day purposes that should not influence end of day cash-out incentives. The netting off process will effectively have matched the highest priced buy actions and the lowest prices sell actions on days where actions have been taken on both sides of the market.

4.7 All volumes remaining in the buy or sell stack, after the netting off process, will be deemed to be "energy" balancing actions, taken for the purposes of achieving an acceptable end of day imbalance.

4.8 Where the process has generated a net buy stack it will by definition from the above process be sorted as follows:

$NBAP_{buy,i}$ = the buy price associated with "transaction" i.
$BAQ_{buy,i}$ = the quantity associated with "transaction" i.
P = the number of trades where P is greater or equal to 1

$NBAP_{buy,P}$	$NBAQ_{buy,P}$
~	~
$NBAP_{buy,2}$	$NBAQ_{buy,2}$
$NBAP_{buy,1}$	$NBAQ_{buy,1}$

$[NBAP_{buy,1} \leq NBAP_{buy,2} \leq \ldots \leq NBAP_{buy,P}]$

4.9 Where appropriate the process will have generated a net sell stack as follows:

$NBAP_{sell,i}$ = the price associated with "transaction" i.
$NBAQ_{sell,i}$ = the quantity associated with "transaction" i.
Q = the number of trades where Q is greater or equal to 1

$NBAP_{sell,Q}$	$NBAQ_{sell,Q}$
~	~
$NBAP_{sell,2}$	$NBAQ_{sell,2}$
$NBAP_{sell,1}$	$NBAQ_{sell,1}$

$[NBAP_{sell,1} \geq NBAP_{sell,2} \geq \ldots \geq NBAP_{sell,N}]$

4.10 Where in aggregate the community have not put in enough gas then the SMP buy price will be set at the relevant point in the net buy stack.

4.11 Where in aggregate the community have put in too much gas then the SMP sell price will be set at the relevant point in the net sell stack.

4.12 The Net System Imbalance (NSI) is calculated.

The following two rules address the circumstances where Transco is a net purchaser for system balancing purposes and relevant Users have under delivered:

4.13 When Transco is a net buyer and the NSI is negative the absolute value of the NSI will be compared with the net buy stack to identify the relevant market price (RMP). The buy stack incorporates ordered pairs of prices and balancing action quantities with the order defined by the price value.

$$\left[NBAP_{buy,i,}\ NBAQ_{buy,i}\right] i = 1..P$$

If

$$ABS(NSI) > \sum_{i=1toP} NBAQ_{buy,i}$$

Then

$$RMP_{buy} = NBAP_{buy,P}$$

Else(For $X = 1..N$*) If*

$$\sum_{i=1toX+1} NBAQ_{buy,i} \geq ABS(NSI) > \sum_{i=1toX} NBAQ_{buy,i}$$

Then

$$RMP_{buy} = NBAP_{buy,X+1}$$

ElseIf

$$ABS(NSI) \leq NBAQ_{buy,1}$$

Then

$$RMP_{buy} = NBAP_{buy,1}$$

4.14 The Relevant Market Price (RMP) is then compared against the default SMP_{buy} price. If it is greater it will become the new SMP_{buy} price.

SMP_{buy}, new = MAX (A, B)

Where

A= Relevant Market Offer Price (RMP)
B= SAP + minimum differential (currently 0.0287 p/kWh)

Additionally

SMP_{sell} = SAP – minimum differential (currently 0.0324 p/kWh)

The following two rules address the circumstances where Transco is a net seller for system balancing purposes and relevant Users have over delivered:

4.15 When Transco is a net seller and the NSI is positive it will be compared with the net sell stack to identify the lowest relevant market action. The sell stack will incorporate ordered pairs of prices and balancing action quantities.

$$[NBAP_{sell,i}, NBAQ_{sell,i}]\ i = 1..Q$$

If

$$NSI > \sum_{i=1toQ} NBAQ_{sell,i}$$

Then

$$RMP_{sell} = NBAP_{sell,Q}$$

Else (For $X = 1..N$) If

$$\sum_{i=1toX+1} NBAQ_{sell,i} \geq NSI > \sum_{i=1toX} NBAQ_{sell,i}$$

Then

$$RMP_{sell} = NBAP_{sell,X+1}$$

ElseIf

$$NSI \leq NBAQ_{sell,1}$$

Then

$$RMP_{sell} = NBAP_{sell,1}$$

4.16 The Relevant Market Price (RMP) is then compared against the default SMP_{sell} price. If it is lower it will become the new SMP_{sell} price.

SMP_{sell}, new = MIN (A, B)

Where

A= Relevant Market Offer Price (RMP) in respect of a Market Balancing Action

B= SAP - minimum differential (currently 0.0324 p/kWh)

Additionally

SMP_{buy} = SAP + minimum differential (currently 0.0287 p/kWh)

The following two rules represent the position where Transco's net system balancing position and relevant Users positions are aligned.

Cash-out prices shall be based on the current minimum differentials as defined in the Network Code:

4.17 Where the NSI is negative and Transco's system balancing has been a net buy or where the NSI is positive and Transco's system balancing has been a net sell then

The "System Marginal Buy Price" shall be the System Average Price plus the relevant minimal cash-out differential (0.0287 pence/kWh).

The System Marginal Sell Price shall be set as SAP minus the current minimal differential (0.0324 p/kWh).

4.18 For the avoidance of doubt the above rules are not intended to change the process of deriving SAP which will not be influenced by the prices associated with Primary and Secondary Excluded Actions.