Lesley Ramsey
Gas Charging and Access Development
UK Transmission
National Grid
NG House
Warwick
CV34 6DA

Promoting choice and value for all gas and electricity customers

Your Ref:
Our Ref:
Direct Dial: 020 7901 7165
Email: hannah.nixon@ofgem.gov.uk

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Dear Lesley

The scope and objectives of the audit statement that accompanies the Incremental Entry Capacity Release (IECR) methodology statement

National Grid Gas (NGG) must submit a copy of the IECR methodology statement to the Authority each year. This methodology statement must be accompanied by a statement produced by independent auditors which gives an opinion on the extent NGG has developed a methodology consistent with their gas transporter licence and Gas Act duties. The scope and objectives of the audit statement must also be approved by the Authority.

Ofgem has considered the proposed scope of the audit statement between NGG and PricewaterhouseCoopers (PwC) in respect of the IECR methodology statement. We agree that Agreed Upon Procedures (AUP) submitted on the 22 July 2011, which outline the scope of the audit statement, should form the basis of the audit. A copy of the AUP can be found in Annex A.

Background to the audit statement

Under paragraph 2 of Special Condition C15 of the gas transporter licence, NGG must submit the IECR methodology statement before the 7 November each year to the Authority. This statement must set out the methodology NGG will use to make incremental entry capacity available to gas shippers.

Paragraph 3 of the same licence condition states that the IECR methodology statement must be accompanied by a statement from appropriate auditors which gives an opinion on the extent the Licensee has developed a methodology consistent with their Licence and Gas Act duties. The scope and objectives of the audit statement must be approved by the Authority.

On 22 July 2011, NGG submitted a copy of the proposed scope, the AUP, of the audit statement agreed between itself and PwC. Broadly, the AUP proposes the auditors undertake an examination of the transportation model to ensure that it is correctly generating Long Run Marginal Costs (LRMCs), and producing correct incremental capacity release costs and step prices. The AUP outlines three elements to carry out this analysis:

- The auditors ensure that supply, demand and pipeline length data used in the transport model is being correctly sourced
- The auditors ensure that data and formulas used within the tariff model are being correctly sourced and calculated
- The auditors ensure correct LRMCs are being generated by creating a simplified model of the NTS, and check that the tariff model is producing correct incremental price steps and costs for releasing incremental capacity

Following the submission of the AUP we asked NGG two questions in relation to the proposed audit scope. The first question was to seek an assurance that the use of the simplified NTS model would ensure the transportation model is generating correct LRMCs for the entire NTS. NGG have stated they are confident the simplified model will ensure the principles of the transportation model are working correctly.

Our second question related to the charging modifications we have approved since the last audit was undertaken in 2008. We queried if any changes made to the transportation model as a result of such charging modifications would be confirmed by the audit. NGG have confirmed the charging modifications approved since 2008 have only amended the input data to the transportation model and not the model itself.

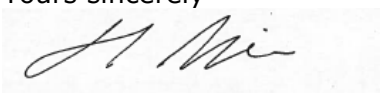
Ofgem decision

Following careful consideration of the AUP, and responses to our discussions with NGG, Ofgem considers that it contains appropriate objectives for the audit statement. On this basis, we are satisfied for the audit statement to be based upon the AUP submitted on 15 July 2011.

We are satisfied by NGG's assurances about the applicability of the simplified model and impact of charging modifications approved since 2008. However, NGG should ensure that future audits contain objectives to ensure the impact of charging modifications on the transportation model are properly assessed.

We also note that the AUP is still in draft form and assume that there will be no changes to the scope or objectives in the final version.

Yours sincerely



Hannah Nixon
Partner, Transmission

Signed on behalf of the Authority and authorised for that purpose

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ANNEX A – THE AGREED UPON PROCEDURES SUBMITTED BY NATIONAL GRID GAS

APPENDIX A – Agreed Upon Procedures

The following limited scope procedures will be performed on the Methodology. Terms and acronyms used below have the same meaning as in the Methodology.

The procedures performed will be over data contained within the following spreadsheet developed and maintained by the Company:

"NTS Transportation Model.xls" ("The Model")

The Model comprises two main elements, the "Transport Model" and "Tariff Model" which have replaced the "Transcost" base cost elements from 2006.

A – TRANSPORT MODEL STANDING DATA

i) For a sample of 10 ASEP's selected haphazardly, agree that the nodal supply data for the Transport Model is derived from the supply/demand match, set out in the latest 'Ten Year Statement';

ii) For a sample of 20 nodes selected haphazardly, agree nodal demand data for the Transport Model will be based on 'SD Statements May'11' provided by the Demand forecast team; and

iii) For a sample of 20 pipe length data selected haphazardly, including new pipelines commissioned in the current year that have been added to the Transport Model, agree that the pipe length is based on the National Grid Pipeline Data Book.

B – TARIFF MODEL STANDING DATA

i) Ensure the expansion constant used within the Tariff model for the March 2012 QSEC auction is expressed in £/GWhkm and is per that calculated in the 'Expansion Factor Calculator' spreadsheet;

ii) Ensure the annuitisation factor used within the Tariff model for the March 2012 QSEC auction is as per that defined in the Licence;

iii) Agree that the pipe diameters used within the 'Expansion Factor Calculator' spreadsheet for the expansion constant are as follows as per the Methodology;

D_1 = 900 mm
D_2 = 1050 mm
D_3 = 1200 mm

iv) Agree the following equations and constants in the 'Expansion Factor Calculator' spreadsheet, used to calculate the expansion constant, to the Methodology and re-perform the expansion constant calculation using the equations given in the Methodology.

The 'Expansion Factor Calculator' spreadsheet uses the Excel Solver functionality to optimise the minimum pressures and therefore calculate the minimum expansion constant. PwC will not re-perform this calculation and will assume these pressures to be correct for the purposes of the procedures performed. For the avoidance of doubt, these are referred to below as:

$P_{2,n}$ – Pipe absolute outlet pressure for network section n (Maximum Daily Flow calculation);
$P_{in,n}$ – Compressor absolute inlet pressure for network section n (Compressor Power calculation).

Maximum Daily Flow

$$Q_n = K_{flow} \times \left(\frac{T_{std}}{P_{std}}\right) \times D_n^{2.6182} \times \left(\frac{P_1^2 - P_{2,n}^2}{G^{0.8538} \times T_{av} \times L \times Z_{av}}\right)^{0.5394}$$

Where

Q_n	=	*Flow for network section n (mscmd)*
K_{flow}	=	*Constant (0.0045965)*
T_{std}	=	*Standard temperature (291.4°K)*
P_{std}	=	*Standard pressure (1.01325 bar_a)*
D_n	=	*Diameter for network section n (mm)*
P_1	=	*Pipe absolute inlet pressure (86.01325 bar_a ~ 85 bar_g)*
$P_{2,n}$	=	*Pipe absolute outlet pressure for network section n (bar_a)*
G	=	*Gas specific gravity (0.6)*
T_{av}	=	*Pipeline average temperature (285.4°K)*
L	=	*Pipe length (100 km)*
Z_{av}	=	*Average gas compressibility (0.85)*

Maximum Daily Energy Flow

$$Capacity_n = \frac{Q_n \times CV}{(1 + FM) \times 3.6}$$

Where

$Capacity_n$	=	*Daily capacity for network section n (GWh)*
Q_n	=	*Flow for network section n (mscmd)*
CV	=	*Calorific Value (39 MJ/m3)*
FM	=	*Flow margin (5%)*
3.6	=	*Converts 10^6 MJ to GWh*

Compressor Power

$$Power_n = \left(\frac{\gamma}{\gamma - 1}\right) \frac{K_{power} \times Z_{av} \times T_{av} \times Q_n}{\eta} \left[\left(\frac{P_{out}}{P_{in,n}}\right)^{\frac{\gamma - 1}{\gamma}} - 1\right] (1 + FM)$$

Where

$Power_n$	=	*Compressor power for network section n (MW)*
$P_{in,n}$	=	*Compressor absolute inlet pressure for network section n(bar_a)*
P_{out}	=	*Compressor absolute outlet pressure (86.10325 bar_a)*
K_{power}	=	*Constant (0.0040639)*
Z_{av}	=	*Compressibility (0.85)*
T_{av}	=	*Average gas temperature (285.4°K)*
Q_n	=	*Flow for network section n (mscmd)*
γ	=	*Isentropic index (1.363)*
η	=	*Compressor adiabatic efficiency (80%)*
FM	=	*Flow margin (5%)*

Pipe Cost

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$Pipe\_Cost_n = L \times (D_n \times Pipecost\_diameter\_factor + Pipecost\_constant\_factor)$

Where

$Pipe\_Cost_n$	=	*Capital cost for pipe in network section n (£m)*
L	=	*Length (100 km)*
D_n	=	*Diameter for network section n (mm)*
Pipecost_diameter_factor	=	*Capital cost factor (£m/km/mm)*
Pipecost_constant_factor	=	*Capital cost factor (£m/km)*

Compressor Cost

$Compressor\_Cost_n = Power_n \times Power\_Unit\_Cost$

Where

$Compressor\_Cost_n$	=	*Capital cost for compression in network section n (£m)*
$Power_n$	=	*Compression power for network section n (MW)*
Power_Unit_Cost	=	*Unit cost for additional power at existing stations (£m/MW)*

Project Cost

$Project\_Costn = Project\_Factor \times (Pipe\_Costn + Compressor\_Costn)$

Where

$Project\_Cost_n$	=	*Project costs for network section n (£m)*
Project_Factor	=	*15%*
$Pipe\_Cost_n$	=	*Capital cost for pipe in network section n (£m)*
$Compressor\_Cost_n$	=	*Capital cost for compression in network section n (£m)*

v) For a sample of 10 ASEP's selected haphazardly, agree 'Obligated Level' figures within the Incremental Entry Price to those under the Licence;

vi) For a sample of 10 ASEP's selected haphazardly, agree the number of steps used for calculation within the Incremental Entry Price to the Methodology.

C – REPERFORMANCE OF THE MODEL

Transport Model

The 'Transport' model element is used to calculate the Long Run Marginal Cost ('LRMC') for supply points based on certain standing data elements, some of which have been discussed in other procedures. The calculation of LRMC's relies on the algorithm within the model to calculate the minimum total distance that gas needs to travel (GW/km) between system entry and exit points and a reference node. The "Excel Solver" is used to produce a 50:50 split between entry and exit charges. Due to the inherent complexities in this process, a full reperformance of these calculations will not be performed. However, PwC will perform basic procedures as follows:

i) For a simplified network, using a reduced number of nodes and semi-complex loops, agreed with National Grid, perform the calculation of LRMC's as per the definition in the Methodology and compare this to the output from the model using the same simplified data. Report any differences and explanations thereof.

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For the avoidance of doubt, this procedure will be performed over the simplified network only. PwC will make no inferences as to how this translates to the numerous other network permutations used to calculate LRMC's within the Model.

Tariff Model

The 'Tariff' model element uses the LRMC's calculated from the Transport model and other standing data elements to calculate the incremental prices for each supply point. Due to the complexities of the calculation of the LRMC's as discussed above, PwC will, for the purposes of the procedures over the 'Tariff' model, assume these LRMC cost estimates are to be valid and these will be referred to as 'Base Figures'. In addition, the values of P_0 used as a base for calculating increments will be assumed correct along with these 'Base Figures'. PwC will perform procedures over the 'Tariff' model as follows:

i) Using the Base Figures provided by the National Grid Transport model, perform an independent recalculation of the Incremental Entry Capacity costs for the 20 price increments calculated by the 'Tariff' model element, based on assumptions agreed with the Company in line with our understanding of the Methodology gained through interview.

Compare this to the costs calculated by the Model and report any variances and explanations thereof.

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