Transcost Review: Technical Report

1. Context

Ofgem have set up a Panel of Experts to assess whether the new and revised UCAGs proposed in the current UCA consultation are sufficiently robust, in order for the Authority to consider a wider UCA review before the next long-term entry capacity auction. The major part of the review is intended to establish whether Transcost is "fit for purpose" in setting the current batch of UCAs.

2. Purpose

The purpose of this report is to provide technical advice on the specific issues specified in the Ofgem Terms of Reference[1] and associated issues identified from the three reference documents provided.[2]

3. Scope of the report

The scope of technical advice specified in the Terms of Reference may be summarised as:

1. Advice on the 2 Policy Options presented in the consultation paper.
2. (If the panel do not consider the proposed UCAG figures sufficiently robust) alternative methods to determine UCA figures
3. Technical assessment of the assumptions in Transcost
4. Improvements and alternatives to Transcost.

It is understood that the policy options are essentially economic, rather than technical issues. There has been no dialogue with the panel and no opportunity to identify technical issues associated with the policy options, so the report does not address items 1 and 2 above.

The present arrangements for calculating UCAs are critically dependent on both the UCA ***process*** and the Transcost modelling ***program***. The process is illustrated in Figure 3.1 of the consultation document and incorporates:

- entry flows
- exit flows
- planning data
- technical assumptions and
- economic assumptions

This report examines the technical issues associated with the Transcost program in the context of the process, based on the limited information examined.

4. The UCA process and Transcost program overview

In principle, there are two methods to determine entry costs. The first involves the use of expert analysts and accurate models. This method is time – consuming and difficult to audit and explain to stakeholders, but potentially accurate. The second method involves the use of a computer model with algorithms to make decisions. This method is faster, consistent, and easier to describe to stakeholders but less accurate and not able to deal with the full range of real scenarios expected. The treatment of parallel pipelines and the omission of new compressor options are examples of simplifications that result from the second method. Any method is likely to involve a trade-off between accuracy and cost reflectivity on the one hand and ease of use and cost of operation on the other hand.

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[1] See Appendix 1

[2] 1. Ofgem Consultation document 139/05 May 2005: Gas transmission – new NTS entry points, reserve prices in auctions and unit cost allowances (UCAs)
2. Transcost – the guide. 3. Network Analysis & the use of Graphical Falcon & Transcost – PowerPoint slides of a presentation to Ofgem and Panel members on 22nd June 2005.

Transco have advised that Transcost produces results that are "fit for purpose". The documents examined do not specify the requirements that must be satisfied, or include information that enables 'fitness for purpose' to be verified or challenged. However, Graphical Falcon has been used to determine results in situations that cannot be handled by Transcost. The reference documents do not explain why Transcost cannot handle large flow increments. This explanation may provide insights into any limitations of the program, or the process.

The UCA determination process is different to the process used by Transco to plan physical capacity required to satisfy system security obligations and is based on a number of process assumptions. The modelling program (Transcost) is different to the program used for physical capacity planning (Falcon) and uses different program assumptions. Some of the process assumptions and steps and some of the Transcost assumptions may have an influence on the robustness of UCAs. However, the information available does not enable the significance of these assumptions to be determined.

4.1 Process assumptions

The key technical assumptions associated with the process are summarised in the table below.

	Assumption	**Technical observations**
1	Baseline capacities incorporate long term auction signals, the SO baselines and Transco's 1 in 20 forecasts. (Step 1)	Different baselines are used for different purposes, such as price controls, auctions, SO incentives and physical capacity planning. It is not clear what are the relative pros and cons of using these different baselines for pricing.
2	Incremental entry flows and exit flows. (Step 2)	It is understood that a single incremental entry flow rate of 9 mscm/day is used, together with 9 mscm/day increases in flows from each exit node. Increasing exit flows by 9mcmd may be consistent with the expected entry flows but the rationale for assuming that exit flows will increase at all as a result of new entry flows has not been provided. An increase of 9mcmd is certainly high for most exit points.
3	Entry flows are balanced by corresponding increases in demands (Step 2)	The process "bundles" changes in supplies with corresponding changes in demands. The process does not appear to distinguish between capacity required solely to 'reconfigure' the network to accommodate changes in supply patterns and capacity required solely to 'reinforce' the network to accommodate changes in demands at exit points. Because of this "bundled" approach, it is then necessary to "apportion" some of the costs of additional capacity to entry (and some to exit) It is not evident whether or not the outputs from this approach are reflective of the actual cost of new investment in physical capacity.
4	Exit flows (Step 2)	The consultation refers to "the uncertainties" associated with exit flows. There is no reference to the obligations of DNs to satisfy the system design criteria, both in relation to DN capacity and in respect of supplies into the Networks through NTS offtakes. It seems likely that these obligations on DNs offer the prospect of the most accurate forecasts available for exit flows.
5	Load absorption is used to balance the network.	This approach appears to be based on the assumptions that: • New supply sources will be balanced by corresponding demands.

		• Demand will match available supplies. • Demands will increase at each exit point pro-rata to the increases in supplies. No evidence or explanation is offered to support these assumptions, which appear to be unlikely.
6	10 year timetable	It would be reasonable for the timetable to reflect the lead time for planning and construction of new capacity. There may also be regulatory or commercial considerations that are outside the scope of this report.
7	Peak day flows	Peak day flows, including the operating margins required to deal with transient effects during days of high demand, are a logical basis for calculations.

4.2 Transcost assumptions

The following assumptions are explicitly stated in the Consultation document (Section 3.3) and Transcost – the guide (TTG)

1. Base network
2. Base year
3. Single constant in the Panhandle flow equation
4. Simplified compressor model
5. Proximity of parallel pipelines
6. Omission of new compressor options
7. Simplified regulator model
8. Indivisible capacity increments
9. Linepack nodes

It is reasonable to use as a base network the existing network, including projects required to accommodate base flows for the base year. The treatment of CV is the most significant simplification in the Panhandle flow equation: changes across the acceptable range[3] would be equivalent to approximately 10% changes in flow rates. Temperature simplifications will affect the analyses of parts of the network affected by compression. Regulator settings affect both NTS capacity and DN capacity. It is not clear what is meant by "setting regulator flows to minimise the total cost of reinforcement"; and what it means for DN capacity.

The information that has been examined does not include data that enables the significance of these simplifications or other assumptions to be quantified, or compared with the consequences of other process assumptions.

5. Improvements and alternatives to Transcost.

From this assessment of limited technical information, in a very short period, without an opportunity for dialogue, no conclusions can be reached about the suitability or otherwise of the Transcost program.

The needs or otherwise for improvements or alternatives to the Transcost model should be determined from a formal specification of the requirements for the process for which the program is being used. There may be merit in considering also the requirements for setting prices for exit capacity, so that the process and program are suitable for both applications.

The specification should include all the details required to design the process, such as:

1. The purpose of the process

[3] Reference data from
www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/6163_NGTs_proposed_Offtake_Code_Business_Rules.pdf

2. The outputs required from the process, including format, accuracy, frequency of updating etc
3. Requirements to inform stakeholders about the process
4. Requirements to inform stakeholders about the outcomes
5. The inputs to the process, including the base network, the basis for entry flows, exit flows, engineering construction costs etc
6. Constraints around the process
7. Accountabilities of the different parties (who does what)
8. Performance requirements for the parties in relation to the defined accountabilities
9. Arrangements for monitoring performance
10. Arrangements for auditing the process
11. Arrangements for reviewing the process, including frequency

Plausible alternatives to the current use of Transcost may include:

a) The use of Graphical Falcon, without any changes.
b) The use of Graphical Falcon with similar simplifications to the Panhandle flow equation that have been applied to Transcost.
c) A derivative of Graphical Falcon designed specifically to deal with entry and/ or exit pricing.
d) The use of alternative proprietary network modelling programs, such as Simone or Synergy.
e) A derivative of other proprietary network modelling programs designed specifically to deal with entry and/ or exit pricing.

Suitability would need to be evaluated against a specification of the requirements of the process, which would take some time to complete.

4. Conclusions

From the limited information examined, it is not possible to determine whether or not the Transcost program is "fit for purpose" or that the results from the UCA process are consistent with the real costs of proving additional capacity in the NTS.

Further work would be needed to investigate the key assumptions summarised in section 4.1 above and to quantify the performance of Transcost against the requirements of the process.

If an alternative approach is required for the longer term, the following work is suggested:

1. Draft a formal specification of the requirements of the process for setting entry capacity charges.
2. Draft a formal specification of the requirements for setting exit capacity charges.
3. Design and conduct a programme to quantify the effect on entry and exit charges of changes to the key technical assumptions. (possibly also key economic assumptions)
4. Design and conduct a programme to determine whether or not Transcost is capable of satisfying the requirements of the process specifications.
5. Use the evidence from investigations to refine the process specifications.
6. If it is determined that an alternative to Transcost is required, draft a formal specification for a requisite modelling program.
7. Evaluate the suitability of current proprietary modelling programs and/or invite vendors to submit proposals for modelling programs that are able to meet the functional specification.
8. Evaluate options for providing a service to Ofgem to operate the process.

Appendix 1

Transcost Review Technical Report

Scope of Technical Advice

The scope of technical advice specified in the Terms of Reference is as follows:

1. The Panel is asked to advise the Authority on the two policy options presented in the current UCA consultation paper and to assess whether the new and revised UCAs proposed in this consultation paper are sufficiently robust in order for the Authority to issue a Section 23 notice in order to include these UCA figures in Transco's NTS GT license.

   It is inferred from Section 5 of the Consultation document that the two policy options are:

   1. Whether or not to bring forward the reassessment of all the UCAGs.
   2. Whether or not the existing UCAGs should be retained and used to cap UCAGs at new entry points.

   It is understood that these policy issues are essentially economics issues, rather than technical.

2. If the Panel members do not consider the proposed (UCAG) figures sufficiently robust they should provide an alternative method by which the Authority could determine UCA figures for the new entry points in the interim period (i.e. now until April 2007). This method should result in sufficiently robust UCAs considering that UCA figures form the reserve price for the long-term entry capacity auctions. The assessment of the proposed UCA figures in the current UCA consultation should involve:

   a. a technical assessment of the assumptions contained in the use of the Transcost model;
   b. to consider whether any alternatives either with respect to Ofgem's assumptions or Transcost itself might be more appropriate in setting UCAs in the near future (i.e. next few months). It is important that any alternatives or improvements with respect to Transcost can be used both in the short-term, given that Ofgem will have to determine a range of UCAs for new entry points during the next few months, and in the medium term.

3. The Panel should address those of the following issues which they consider the most pertinent:

   a) Technical Assumptions in Transcost

   - What should constitute the 'base' network? Currently, it is the existing network plus projects to accommodate base flows.
   - What should be the starting year for building the base network?
   - In order to model the network, the network will have to be balanced. The two main methods which might be used are 'load absorption' and 'substitution of supply', however, a combination of these methods might

also be possible. The proposed UCAs have been modelled using load absorption, is this appropriate or should another approach be considered? In case of the latter, how should this be done? For example, in case of substitution, how would we decide how much to substitute at which terminal?

- What is the appropriate flow increment? Should the flow increment be based on the new entrant's anticipated flow rate or should the same flow increment be used for the setting of all UCAs?
- Should the modelling take into account variations in capacity due to CV, temperature, etc.

b) Improvements and alternatives to Transcost

- Is there a need for the base network assumptions to be subject to a regular, eg. annual review?
- Should there also be a more regular updating of the engineering cost database?
- In any event, should the Transcost outputs be validated by reference to Transco's Falcon model or some other independent modelling program?
- If Transcost is deemed unsuitable, what is the available alternative to determining UCAs in the short-term?