Issue	Revision
0.2	Consultation draft

nationalgrid

The Generic Entry and Exit Revenue Driver Methodology Statement

Effective from 1st November 2013

GENERIC REVENUE DRIVER METHODOLOGY STATEMENT

Document Revision History

Version/ Revision Number	Date of Issue	Notes
0.1	October 2012	Draft for consultation
0.2	June 2013	Draft for consultation (updated for RIIO-T1 outcome)

About this Document

This document contains the statement of the methodology that National Grid Gas plc ("National Grid") in its role as holder of the Gas Transporter Licence in respect of the NTS ("the Licence") employs to determine Revenue Drivers. Revenue Drivers are the means of increasing National Grid's allowed revenue as a consequence of the release of Funded Incremental Obligated Capacity to fund the construction of additional assets and/or contractual arrangements to facilitate the release of that capacity.

This document ("Generic Revenue Driver Methodology Statement") has been produced to comply with the Licence obligation to produce a generic entry and exit revenue driver methodology ("Generic Revenue Driver Methodology") to determine any additional revenue allowances relating to the release of funded incremental obligated entry capacity and funded incremental obligated exit capacity.

This document is one of a suite of documents that describe the release of Capacity by National Grid and the methodologies behind them. The other documents are available on the National Grid website at:

http://www.nationalgrid.com/uk/Gas/Charges/statements/transportation/

This Generic Revenue Driver Methodology Statement will be applied from 1 November 2013.

This document has been published by National Grid in accordance with Special Condition 9C of the Licence[1]. National Grid believes the content is consistent with its duties under the Gas Act and is consistent with the Standard Conditions, Standard Special Conditions and Special Conditions of the Licence.

If you require further details about any of the information contained within this document or have comments on how this document might be improved please contact the NTS Gas Charging and Access Development team on 01926 654048 or at box.transmissioncapacityandcharging@nationalgrid.com or at:

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[1] When the revised Licence is available for the RIIO-T1 period, this reference, and other Licence references throughout this Statement, may need amendment.

Contents

GENERAL INFORMATION

Background

1. National Grid is the owner and the operator of the gas National Transmission System (NTS) in Great Britain.

2. The NTS plays an important role in facilitating the competitive gas market and helping to provide the UK with a secure gas supply. It is a network of pipelines, presently operated at pressures of up to 94 bar_g, which transports gas safely and efficiently from coastal terminals and storage facilities to exit points from the system. Exit points are predominantly connections to Distribution Networks (DNs), but also include storage sites, and direct connections to power stations, large industrial consumers and other systems, such as interconnectors to other countries.

3. These operations are carried out to meet the needs of the companies that supply gas to domestic, commercial and industrial consumers and to power stations.

4. This document sets out the statement of the methodology that applies for the determination of Revenue Drivers linked to the release of incremental entry and exit capacity i.e. capacity to be made available above the prevailing level of Obligated Entry and Exit Capacity, in response to signals received from Users through processes described in the Uniform Network Code.

5. Revenue Drivers are used to allow National Grid's allowed revenue to increase when it has accepted additional capacity obligations. This increased revenue is required for National Grid to undertake the full range of activities necessary to deliver additional system capability to support the increased capacity obligation (for example, engineering design, planning, asset build, commercial contracting etc.). This statement defines the process for determining Revenue Drivers.

6. Details of National Grid and its activities can be found on its internet site at www.nationalgrid.com.
An electronic version of this document can be found at the following internet page "http://www.nationalgrid.com/uk/Gas/Charges/statements/".

7. It is important that National Grid is made aware of potential developments where Obligated Incremental Entry or Exit Capacity may be required (at existing or new entry or exit points) at an early stage. This is needed so that discussions can be held with the customer in relation to any additional work that may be required, including facilitating the physical connection[2] to the NTS, whether this is at a new or existing entry or exit point.

[2] The connection work is not funded by the Revenue Driver and is charged for separately as specified in "The Gas Transmission Connection Charging Methodology" in UNC TPD Section Y Part A2 as required by Licence Standard Condition 4B.

8. For the avoidance of doubt, this Statement relates to the determination of Revenue Drivers applicable to the release of Incremental Obligated Entry and Exit Capacity. A separate process (not covered by this Statement) is followed for the provision of a new (or amendment to an existing) physical connection. Further information about connection services is also available on the National Grid website. National Grid's Customer Services team provide connection services and can be contacted via e-mail to: transmissionconnections@nationalgrid.com.

National Grid's Licence Obligations

9. Overriding obligations applicable to this Statement and the release of Entry and Exit Capacity are set out in the Gas Act and the Licence.

10. Specific obligations in respect of the release of Incremental Obligated Entry and Exit Capacity are set out in Special Conditions 5F and 5G of the Licence.

11. Under Special Condition 9B, National Grid must prepare and submit to the Authority for approval the Entry Capacity Release Methodology Statement (the "ECR") setting out the methodology by which National Grid will determine the quantity of Incremental Entry Capacity.

12. Under Special Condition 9B, National Grid must prepare and submit to the Authority for approval an NTS Exit Capacity Release Methodology Statement (the "ExCR") setting out the methodology by which National Grid will determine the quantity of Incremental Exit Capacity.

13. The methodologies produced in accordance with paragraphs 11 and 12 require the determination of Revenue Drivers. This statement provides the methodology by which such Revenue Drivers will be determined.

CHAPTER 1: PRINCIPLES

Purpose of the Methodology Statement

14. This Methodology Statement has been produced to meet the requirements of Special Condition 9C of the Licence. This condition requires the preparation of a statement setting out the methodology by which National Grid will determine any additional revenue allowances ("Revenue Drivers") relating to the release of Incremental Obligated Entry and Exit Capacity. National Grid believes the content is consistent with its duties under the Gas Act and the Licence.

15. Revenue Drivers are used to increase National Grid's allowed revenue where it has accepted additional capacity obligations. This increased revenue is required for National Grid to undertake the full range of activities necessary to deliver incremental system capability to support the increased capacity obligation (for example, engineering design, planning, asset build, commercial contracting etc.). This Statement defines the process for calculating Revenue Drivers.

16. In response to the changes introduced by the Planning Act 2008 (as amended), National Grid has developed a generic multi-stage approach, which has been shared with the industry, to illustrate the planning process stages leading up to a submission to the Planning Inspectorate for a Development Consent Order (DCO). Some of these stages may overlap. The actual timeline duration will depend on the nature and complexity of the project, and is expected to be shorter when a DCO is not required.

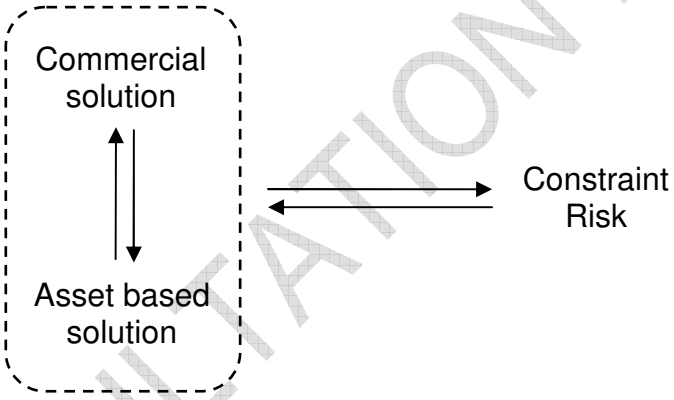
Planning Stage		Activity	Duration
1a	Strategic Optioneering	Establish the need case and identify technical options	Up to 6 months
1b		Develop Strategic Options Report (SOR)	Up to 6 months
2	Outline Routing and Siting	Identify Preferred Route Corridor / Siting Studies	Up to 15 months
3	Detailed Routing & Siting	Undertake EIA (Environmental Impact Assessment) & detailed design	Up to 24 months
4	Development Consent Order (DCO) Application preparation	Formal consultation, finalising project, preparation of application documentation	
5	DCO Application, Hearings and Decision	Submission and examination	Up to 15 Months
6		Approval process	

17. The Revenue Driver represents a capital investment cost, including pre-construction activities and the physical asset build. Application of the Revenue Driver through the totex[3] process funds the investment and/or commercial/contracting alternatives (as applicable) to support the delivery of Funded Incremental Obligated Capacity as a consequence of the receipt of a formal capacity signal.

Methodology Objective

18. The primary purpose of the methodology detailed in this statement is to determine Revenue Drivers in relation to Funded Incremental Obligated Entry and Exit Capacity volumes.

19. When releasing Funded Incremental Obligated Capacity on the Network, National Grid will look to achieve the optimum balance between investments, commercial solutions and capacity constraint risk on the network (see Appendix A).



20. Asset and commercial solutions both alter (directly or indirectly) network capability, and this adjustment needs to be considered against the change in capacity constraint risk[4]. For example, simplistically, where the capability provided by new assets is less than the amount of Incremental Obligated Capacity released, the network capacity constraint risk on the system may reasonably be expected to increase; conversely where the added capability is greater than the amount of Incremental Obligated Capacity released, the network capacity constraint risk may be expected to decrease.

[3] The RIIO framework treats capex and opex on an equivalent basis, thus removing any distortions around the incentive properties of different types of expenditure.

[4] For clarity, a contractual / commercial solution does not create additional system capability, rather it facilitates the re-distribution of existing capability

21. The objective of this Generic Revenue Driver Methodology is to identify the investment cost associated with making available Incremental Obligated capacity over and above the prevailing Obligated Capacity levels. This value can equally be considered to reflect the costs that would be avoided if a commercial / contractual solution were to be possible and hence allows the relative merits of these two options to be considered. In the case where, for all or a part of a Funded Incremental Obligated Capacity signal, a commercial / contractual solution is the most economic and efficient investment solution, a 20% downward adjustment to the investment costs identified in the calculation of the Revenue Driver for the relevant capacity increment will be applied[5].

22. This analysis will also allow National Grid to undertake capacity constraint risk analysis on the Network to determine how either/both options (investment and commercial solutions) change the inherent level of capacity constraint risk on the Network.

23. Treatment of the costs and associated revenue streams is important to ensure there is no cross-subsidy between forms of control (TO/SO), and that costs are recovered from the appropriate user base:

- Direct provision of increased network capability through the provision of an asset solution is defined as a TO activity, with costs incurred and revenues received (through addition of the calculated Revenue Driver to the TO totex allowance) by the TO. The totex incentive mechanism (TIM) will capture any under or overspend on delivery against the allowed revenue[6].

- Re-distribution of network capability through a commercial solution should be considered a TO activity as it is a direct alternative to physical investment. Revenues will be received by the TO (through the addition of the calculated Revenue Driver to the TO RAV); however, it must be recognised that it is the SO who bears the capacity constraint risk resulting from the absence of the physical investment. It is therefore appropriate that the TO compensates the SO by the value of the Revenue Driver, and the SO use this compensation to put in place any necessary commercial arrangements. The full revenue allowance will feed into the TO RAV (regardless of the actual initial spend) to reflect the fact that the contracting costs will be ongoing and individual contracts are likely to be of relatively short duration.

- The acceptance of a different level of inherent network capacity constraint risk is defined as an SO activity, with the costs of any constraint management action feeding into the SO constraint management incentive arrangements.

Process Steps

24. The following section describes the key steps from triggering the calculation of a revenue driver through to the change to National Grid's allowed revenue following a Revenue Driver being triggered by the release of Incremental Obligated Entry or Exit Capacity.

[5] This was the approach taken by Ofgem during TPCR4 and was intended to provide an incentive to investigate potential scope for contracting solutions for the delivery of incremental capacity
[6] The efficiency rate is 44.36%

Revenue Driver Calculation Trigger

25. The Revenue Driver will be calculated from this Generic Revenue Driver Methodology as soon as sufficient data is available and no later than the start of stage 3 of the planning process.

- Where no significant new Above Ground Installations (AGIs) are required, the Revenue Driver will be calculated within stage 2 [7] following a desk-top study.

- Where a significant new AGI is required, and hence where this may materially affect a pipeline route corridor, the Revenue Driver will be calculated at the beginning of stage 3 following more detailed routing and siting studies.

26. The determination of a Revenue Driver will be triggered by;

- Signature of a Full Connection Application Offer[8] in accordance with the UNC; and

- A formal request from that User for the determination of a Revenue Driver at the relevant System Point.

27. Where a Revenue Driver already exists for an entry or exit point, it will be recalculated if there are material changes to;

- The level of Funded Incremental Obligated Capacity required

- The availability of unsold capacity at the relevant system point or in interacting zones/ASEPs

- The forecast supply and demand scenario

Revenue Driver Calculation

28. The Revenue Driver will be based on the agreed RIIO Unit Cost Library[9], which represents an estimation of the unit costs of the pre-construction activities and the physical build required on the Network, and will include a 20% discount where National Grid identifies that it will be pursuing contractual solutions, to provide the required Funded Incremental Obligated Entry/Exit Capacity.

29. The Revenue Driver will be calculated from the reinforcement projects identified by Network Analysis (as described further below) but with regard to likely real-world construction options (such as specific potential route corridors) to enable an appropriate investment cost to be calculated by the application of unit costs from the agreed RIIO Unit Cost Library, where available.

[7] Stage 2 of the planning process covers 'Outline Routing and Siting' and will result in the identification of a preferred route corridor and/or identification of sites.

[8] A "Full Connection Offer" is defined in UNC TPD Section V 13.3.1 and is required for any new connection or enhancement to an existing connection to the NTS

[9] Where a unit cost has not been agreed, National Grid will provide a cost estimate. Please see paragraph 70 for clarification

30. It is necessary to undertake the calculation of the Revenue Driver sufficiently early in the planning process to be able to provide a basis against which to assess non-investment options and to incentivise efficient solution delivery, and yet late enough to ensure that the appropriate level of information necessary for the calculation is available.

31. The release of Funded Incremental Obligated Capacity, and hence the application of the Revenue Driver, triggers:

- Funding for National Grid pre-construction and construction activities (in cases where construction is required)[10]
- Funding for National Grid to implement a contracting solution (where contracting is seen as a more economic option to construction)
- A combination of the above options as appropriate

32. Whilst calculated during the planning process, the Revenue Driver would trigger an adjustment to the allowed revenue only upon allocation of the associated Funded Incremental Obligated Entry/Exit Capacity following receipt of a valid formal capacity signal from a User.

33. When calculating a Revenue Driver, National Grid must take account of the existing level of Obligated Capacity at system entry/exit points which interact with the system entry/exit point where additional capacity is required. Obligated levels of capacity are, in aggregate, far beyond current NTS capability, therefore, when calculating an appropriate Revenue Driver, National Grid will first assess the inherent level of capacity constraint risk on the Network i.e. the pre-existing difference between Obligated Capacity levels and actual Network capability. It should be noted that the NTS Licence defined gas security standard (the "1-in-20" standard) relates to demand only and hence, while exit investment is considered in relation to the security standard, entry investment is considered in relation to capacity constraint risk. Examples of how entry and exit capacity are assessed are included in Appendix C.

34. The Revenue Driver calculation will then take account of the investment, identified to increase system capability in order to accommodate the increase in Obligated Capacity. This calculation will identify the investment cost against which other non-investment solutions can be assessed and not the cost of those non-investment solutions as such costs will not be known at that time.

Revenue Driver Trigger

35. Increased allowed revenue, through the application of the Revenue Driver, will be triggered when National Grid releases Incremental Obligated Entry/Exit Capacity, i.e. an additional obligation which cannot be satisfied through capacity substitution.

[10] Note, this is a single Revenue Driver allowance.

36. National Grid can only permanently increase the level of Obligated Entry and/or Exit Capacity having first assessed how much capacity may be substituted to meet any increase as a result of applying its Entry and Exit Capacity Substitution Methodologies.

37. Capacity substitution is the process of substituting Unsold Non-Incremental Obligated Entry/Exit Capacity from one or more system points to another system point where demand for capacity exceeds the available Obligated Entry/Exit Capacity for the relevant period.

38. Incremental Obligated Capacity release will be classified as Funded Incremental Obligated Entry/Exit Capacity and arises when:

- one or more NTS User(s) signal a requirement for new or additional capacity rights at a new or existing NTS entry or exit point, which would result in capacity holdings in excess of the prevailing Obligated Entry/Exit Capacity levels that National Grid is obliged to provide;

and the full Revenue Driver funding will only be triggered after:

- National Grid has progressed through the planning submission development process to the appropriate point[11]; and

- a capacity bid/application that passes the relevant user commitment test, (such that release of this capacity is viewed as economic) has been made and which cannot be met, in whole or in part through capacity substitution.

Revenue Driver Funding

39. Upon release of Funded Incremental Obligated Entry/Exit Capacity, following receipt of a valid capacity signal that requires the release of Funded Incremental Obligated Entry/Exit Capacity, National Grid's totex allowance revenue will increase by the level determined by the Revenue Driver. The totex allowance will be phased with 20% in Y-2 and 80% in Y-1 where Y is the Formula Year during which the Contractual Delivery Date for Funded Incremental Obligated Entry or Exit Capacity falls.

Methodology Overview

40. The principle steps of the Generic Revenue Driver Methodology, as described in Chapter 2, are as follows:

1) National Grid will use one relevant supply/demand scenario[12] to identify investment projects required to increase network capability so as to deliver 100% of additional capacity.

2) National Grid will cost up these projects using unit costs from the agreed RIIO Unit Cost Library, where available, to calculate an 'investment only' Revenue Driver representing the capital cost of increasing network capability

3) National Grid will identify if a full or part contractual solution is the optimum solution (not taking account of the residual capacity constraint risk at this stage)

[11] Either successful granting of a Development Consent Order (or equivalent local planning consent) in cases where an investment option is being progressed and planning consent is required or equivalent agreed trigger point within the planning process in cases where commercial / non-planning consent solution(s) are the chosen option(s).
[12] Note that the relevant supply and demand scenario will be specific to the relevant entry/exit point.

4) National Grid will use 100% of the investment costs for the Revenue Driver for any part of the additional capacity met through network investment and 80% of the investment costs for the Revenue Driver for that part of the solution for which a contract is the best option.

5) After calculating the Revenue Driver, National Grid will identify if there is a material change in residual capacity constraint risk, arising from the proposed investment/contract solution, and hence may propose changes to the constraint management target.

Revenue Driver Submission Process

41. Following application of the methodology, National Grid would provide Ofgem with;

- The supply/demand scenario used to identify investment projects, the steps taken to rebalance supply and demand following the addition of flows consistent with the additional capacity requested and the justification for the demand level modelled.
- The identified projects and associated costs based on the agreed RIIO Unit Cost Library, where available, and using estimated costs where unit costs have not been agreed
- Whether a full or part contractual solution is the optimum solution (not taking account of the residual capacity constraint risk)
- Whether there is a material change in the residual capacity constraint risk, arising from the proposed investment/contract solution, and hence propose changes to the constraint target for Ofgem's consideration as per Special Condition 3B Part J in National Grid's Licence.

42. Following receipt of the Revenue Driver information, Ofgem would then consult on the inclusion of the Revenue Driver in the Licence.

Worked example

43. A signal for 100 units of additional capacity is received. The optimised solution for a specific scenario is for 60 to be delivered by physical investment and 40 by commercial solution. There will also be a change to the inherent network capacity constraint risk for all potential supply/demand scenarios. The calculated cost for physical delivery in this case is £1m/unit capacity.

	Capacity	TO		SO
		TO receives into totex allowance	TO pays to SO annually	SO receives
Physical delivery	*60*	*(60 units * £1m/unit) = £60m*	-	-
Commercial arrangement	*40*	*(40 units * 0.8 * £1m/unit) = £32m*	*Revenue from £32m in TO totex allowance* ⇨	*Revenue from £32m in TO RAV*
Inherent risk change (+/-)	-	-	-	*Reflected in Constraint Management target*

44. Once a Revenue Driver has been determined and a valid capacity signal received and allocated[13] that requires the release of Funded Incremental Obligated Capacity, National Grid will determine the most economic and efficient solution to facilitate the release of that capacity through the optimisation of the three factors above. The process for identifying the optimal combination is outlined in appendix A.

45. National Grid will then provide the Authority with a capacity notice setting out the proposal for additional firm capacity

- to be treated as either:
    - Funded Incremental Obligated Entry Capacity, or;
    - Funded Incremental Obligated Exit Capacity.
- The notice may also make reference to the constraint management target as required, subject to a material change in constraint risk

[13] Excluding by substitution

CHAPTER 2: CALCULATION METHODOLOGY

Network Analysis Methodology

46. The following Generic Revenue Driver Methodology is proposed for calculating Entry and Exit Capacity Revenue Drivers:

Network Model and Supply / Demand Forecast Assumptions

47. The gas year to be used in the network analysis to determine a Revenue Driver will be the gas year that the Shipper/Developer has specified that additional capacity will be required or a later year where in that year forecast capacity utilisation, including Funded Incremental Obligated Capacity, has already been signalled and is to be released at the relevant system point, or in an interacting zone/ASEP. Forecast data will be capped at the Obligated Capacity level other than where additional capacity has been signalled.

48. A network model of the NTS will be used for the analysis consistent with the gas year identified for analysis, in line with National Grid's Transmission Planning Code.

49. National Grid's supply and demand forecasts for the relevant gas year will be used as a basis for the analysis. The forecast data used will be that agreed via the most recent completed Transporting Britain's Energy (TBE) / Future Energy Scenarios (FES) process. Levels of Entry/Exit Capacity will be considered depending on the type of NTS System Point being considered for the release of incremental capacity (see Appendix B). For further information on National Grid's supply and demand forecasts, see National Grid's Transporting Britain's Energy (TBE) Documentation, Future Energy Scenarios (FES) publication and Ten Year Statement (TYS).

50. Network investment projects which are currently planned for completion in readiness for the gas year in question (including contractual arrangements between National Grid and NTS Users which are applicable to the year/demand level to be considered) will be included in order to provide a best view of the topology of the NTS in that year. For further information on planned infrastructure, see National Grid's Ten Year Statement.

51. All analysis will be conducted using Transient (Dynamic) Analysis, taking into account changes in system conditions over the course of the gas day, using NTS Exit (Flexibility) Capacity / Distribution Network (DN) Diurnal Storage levels consistent with the assumed demand level. DN exit point profile shapes, as provided by Distribution Network Operators, will be used. For further information on the types of analysis undertaken by National Grid, see Section 9 of National Grid's Transmission Planning Code.

52. Analysis will be completed using an appropriate Design Margin incorporating a Flow Margin and Pressure Cover at system extremities. For further information on Design Margins, see Section 9.5 of National Grid's Transmission Planning Code.

53. All NTS operating limits such as Assured Offtake Pressures (for Distribution Network Exit Points) which are applicable to the demand level assumed, Anticipated Normal Operating Pressures (for Directly Connected Exit Points) and Maximum Operating Pressures will be adhered to throughout the analysis.

54. All NTS plant will be assumed to be operational, other than where plant is providing standby capability, and compressor performance will be determined from the ambient air temperature for the relevant demand level, in line with National Grid's Transmission Planning Code.

Determining the Demand Scenario for Analysis

55. An appropriate demand scenario for the incremental capacity type and type of NTS System Point being considered will be selected as per table 1 from Appendix B. Examples are included in Appendix C.

Determining the Supply Scenario for Analysis

56. An appropriate supply pattern for the Incremental capacity type and type of NTS System Point being considered will be selected as per table 2 from Appendix B. Examples are included in Appendix C.

Reinforcement for Incremental Capacity

57. Reinforcement covers the construction of additional assets or modification to existing assets to increase network capability.

58. The incremental supply/demand for the ASEP/exit point being considered will then be added. A supply/demand balance will be maintained using the same assumptions as those previously used (as described in tables 1 and 2 from Appendix B).

59. For Entry Capacity Revenue Driver Analysis, the reinforcement projects considered will be those required to increase system entry capability for the ASEP above the obligated Entry Capacity level **but not** those required to increase system exit capability should the reduction in supply at balancing ASEPs lead to low pressure constraints. If low pressure constraints are triggered by insufficient levels of supply at a balancing ASEP then supply levels at that ASEP will be increased to alleviate the constraint and the next balancing ASEP, as defined in Appendix B Table 4, will be used.

60. For Exit Capacity Revenue Driver Analysis, the reinforcement projects considered will be those required to increase system exit capability for the Exit Point above the obligated Exit Capacity level **but not** those required to increase system Entry capability should the increase in supply at balancing ASEPs lead to a high pressure constraints. If high pressure constraints are triggered by excess supplies at a balancing ASEP then supply levels at that ASEP will be reduced to alleviate the constraint and the next balancing ASEP, as defined in Appendix B Table 5, will be used.

61. Only those reinforcement projects that directly affect the NTS' capability to accommodate the additional supply/demand being considered will be identified. Investment / costs to mitigate constraints incurred as a result of plant being unavailable through construction / commissioning activities will not be included in Revenue Driver calculations as a proposal may be made to include these in the Constraint Management Incentive.

62. The required reinforcement projects (if any) will be recorded and a cost estimate determined. The cost estimates will be calculated using the unit cost from the agreed RIIO Unit Cost Library as detailed below.

Calculation of Revenue Driver

63. National Grid will determine, using the methodology described above, the investment that would be required to deliver the requested incremental capacity. The Revenue Driver will be calculated from this proposed investment solution and unit costs from the agreed RIIO Unit Cost Library, where available, or propose costs for those items not agreed..

64. The precise point in time at which sufficient information is available to undertake this calculation will vary from case to case. For example, where stage 1 of the planning process, and market information, clearly indicates that a commercial solution is the favoured option, the Revenue Driver calculation can take place at the start of stage 2 of the planning process. Conversely, in the opposite situation where stage 1 of the planning process indicates a requirement for significant physical asset investment, it is likely to be later within stage 2 of the planning process before sufficient information is available to calculate the Revenue Driver.

- Where no significant new AGIs are required, the Revenue Driver will be calculated within stage 2 following a desk-top study.
- Where a significant new AGI is required, and hence where this may materially affect a pipeline route corridor, the Revenue Driver will be calculated at the beginning of stage 3 following a more detailed routing and siting study.

65. Where a Revenue Driver already exists for an entry or exit point, it will be recalculated if there are material changes to any of the following;

- The level of incremental capacity requested
- The availability of unsold capacity at the relevant system point or in interacting zones/ASEPs
- The forecast supply and demand scenario

Pipelines

66. Where pipeline projects are required to support the delivery of incremental capacity (either as stand alone projects or as part of a wider network reinforcement project), unit costs from the agreed RIIO Unit Cost Library, based on the pipeline length and diameter, will be used.

67. For commercial sensitivity reasons, the unit cost assumptions will not be published, as to do so would significantly weaken National Grid's position in future procurement negotiations.

Compression projects

68. Where compression projects are required to support the delivery of incremental capacity (either as stand alone projects or as part of a wider network reinforcement project), the agreed RIIO Unit Cost Library, based on the required power and fuel type of the station, will be used.

69. For commercial sensitivity reasons, the unit cost assumptions will not be published, as to do so would significantly weaken National Grid's position in future procurement negotiations.

Other activities

70. There are a number of other construction activities which may be required in the provision of incremental capacity, these are listed below. These are not currently included in the agreed Unit Cost Library but where it is identified that these activities would be required, National Grid would propose alternative costs for consideration by Ofgem.[14]

- Flow Modifications including;
    - change-out of compressor station pipework and associated equipment to facilitate increased flow rates
    - Compressor re-wheels
- Multi-junction Modifications (for example, modifications to pipework and associated equipment to facilitate new configurations which may involve compressor discharging on alternate pipelines)
- Pipeline Up-rating (modifications to pipework and associated equipment to allow operation at higher pressures)
- Flow Control Valves (for example, to facilitate new configurations or re-optimise utilisation of existing assets)
- New AGIs required, including for Flow Control Valves and Pressure Reduction Installations

General

71. In the case of a commercial / contractual solution being the most economic and efficient investment option for all or a proportion of an incremental capacity signal, National Grid / Ofgem will apply a 20% downward adjustment to the relevant proportion of the capital costs identified in the calculation of the Revenue Driver.

72. Where accepting that a change in risk on the network is the most economic and efficient option (or where there is a change in residual network capacity constraint risk allowing for the effects of physical investment and/or commercial/contractual solutions) a proposal may be made to adjust SO constraint management target to reflect the changed level of capacity constraint risk on the Network.

[14] It is recognised that this may add extra time to the process of calculating a Revenue Driver and therefore National Grid will endeavour to make a proposal to Ofgem with a view to adding unit costs for these items to the RIIO Unit Cost Library.

73. As a result of (or prior to the receipt of) a formal capacity signal, National Grid will have determined the most economic and efficient investment solution to increase NTS capability to accommodate the increase in supply or demand.

74. National Grid may have previously received funding (either in part or in full) for a reinforcement project identified in this analysis. In this case, cost estimates equivalent to the received funding for that project will not be included in the total costs and the details of any unfunded or partially funded projects will be included in the reporting tables for completeness.

75. It is important to note that, whilst National Grid may have previously agreed funding for a reinforcement project, it may be necessary to include further costs if the scope/capability/requirements of the funded reinforcement project are insufficient for this analysis.

76. For example, if National Grid had previously received funding for a new 8MW (+8MW standby) compressor station at a defined location and, during this analysis, it was identified that a 12MW (+12MW standby) compressor station was required, then costs included in the Revenue Driver will be cost of the 12MW (+12MW standby) compressor station minus the funding already received for the 8MW (+8MW standby) compressor station.

77. Note that this only applies in cases where the initially identified reinforcement has not yet been built (or National Grid has not yet committed to contract for investment). Where the initial reinforcement has proceeded beyond the point of contract award, it will be necessary to separately address and fully fund any additional incremental requirement identified as a result of a subsequent signal.

Commercial/Contractual Solutions

78. The Generic Revenue Driver Methodology is a defined process for;

- Identifying the investment requirement to increase system capability to meet an incremental capacity signal
- The application of a 20% downward adjustment to all (or a proportion) of the investment costs identified to meet that incremental capacity signal when it can be met through a commercial solution
- Identifying a material change in the residual level of capacity constraint risk on the Network, potentially triggering proposal to Ofgem to change (increase or decrease) the SO constraint management target

79. When assessing potential capacity related investments, National Grid will consider multiple supply and demand scenarios based on information within the Future Energy Scenarios[15], and considers combinations of various alternative investment and commercial/contractual solutions. Appendix A outlines the decision making process for considering investment versus contractual solutions.

[15] The UK Future Energy Scenarios document describes the scenarios used in National Grid's annual planning processes. It covers material previously included in the Gas Ten Year Statement. More information can be found at; http://www.nationalgrid.com/uk/Gas/OperationalInfo/TBE/Future+Energy+Scenarios/

Residual Network Capacity Constraint Risk

80. National Grid will use a probabilistic model and associated methodology to forecast capacity constraint volumes and costs on the NTS. This model and associated methodology are referred to as the entry and exit capacity constraint forecasting model / methodology (the "EECC forecasting model / methodology") and were used to set the initial RIIO-T1 constraint targets.

81. The EECC forecasting model and associated methodology provides a probabilistic forecast (a range of potential outcomes along with their likelihoods) of expected constraint volumes and associated costs for a period. This model quantifies both entry and exit constraints as they are interlinked e.g. solving an exit constraint can generate an entry constraint and vice versa.

82. The model and methodology have been developed to determine if the NTS has sufficient capability to cope with a wide range of supply and demand patterns. A constraint is identified when network analysis indicates that the forecast supply / demand pattern would result in either pressures at entry points exceeding pre-determined limits (e.g. operational / safety limits) or pressures at exit points being lower than pre-determined limits (e.g. assured / agreed limits).

83. The EECC forecasting model is built around an Access database and the Simone Network Analysis software used by National Grid. The EECC forecasting model methodology is based on the premise that network analysis provides the best view of forecasting network capability and that previous network analysis studies can be used to analyse new networks with similar supply / demand patterns.

84. The model can assess approximately 120 scenarios per hour and so analysing the entire population of annual supply / demand patterns is not practical. To overcome this, a representative sample of supply / demand patterns will be tested and the results from this sample used to forecast the constraint volumes for the population as a whole.

85. The probability distributions representing the likelihood of a constraint will be used in conjunction with Monte Carlo sampling techniques to build an appropriate model of the overall capacity constraint risk for the periods being considered.

86. The probability functions of supply, demand and capability are used to forecast constraint events, constraint shortfalls (supply minus capability) and constraint volumes (baseline minus capability).

87. The output data is combined to form summary statistics of event risk, volume and costs. These are in turn used to determine distributions of potential constraint events and the associated volumes and costs.

88. Using the EECC model & methodology, National Grid will evaluate the level of capacity constraint risk on the Network prior to the release of the requested incremental capacity. The model / methodology will then be applied again with the inclusion of the requested incremental capacity and the proposed physical system reinforcements and/or commercial/contracting solution(s) as appropriate.

89. The difference between these two iterations of the model will indicate the net change in the residual network capacity constraint risk. This change in network capacity constraint risk will then be proposed to Ofgem as a change to the SO Constraint Management Target.

- Where the residual capacity constraint risk on the Network has increased, the SO constraint management target will be increased by an appropriate amount from the incremental capacity release date onwards.

- Where the residual capacity constraint risk on the Network has decreased, the SO Constraint management target will be decreased by an appropriate amount from the incremental capacity release date onwards.

APPENDIX A: INVESTMENT V COMMERCIAL SOLUTIONS

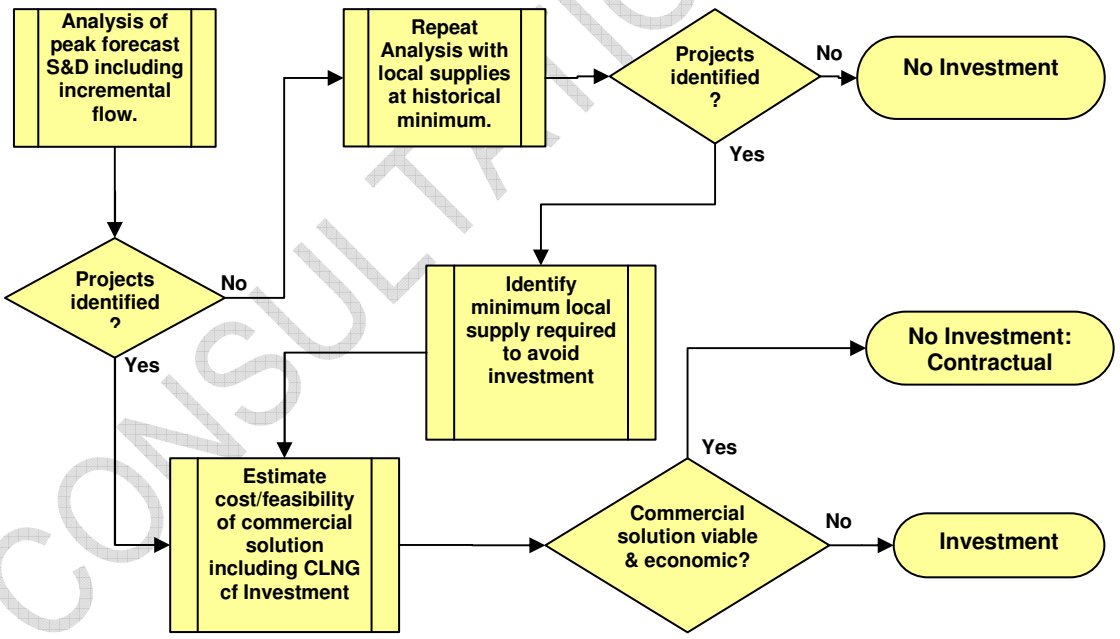
This appendix outlines the high level processes for considering the appropriate solution for the provision of incremental entry and exit capacity.

Exit capacity

The main driver for exit capacity investment is the 1-in-20 obligation. The Safety Case and 1-in-20 obligation require the system to be designed to meet demand up to the 1-in-20 level taking into account demand reduction rights. Analysis is carried out at high/peak demand levels with forecast entry flows to identify investment and constrained LNG requirements. If no investment is identified at these demand levels, further analysis for minimum local supplies is carried out, and further investment may be identified as being required. Where investment has been identified, the potential for contractual solutions will be identified.

In regard to the provision of exit capacity, the investment versus contractual solutions/buy-back risk issue must be considered in relation to National Grid's wider security of supply obligations including the 1-in-20 obligation and the gas Safety Case. The 1-in-20 obligation requires us to consider the commercial arrangements in place and National Grid's contractual rights to curtail demand at the time of making exit capacity driven investment decisions rather than closer to real time gas flows. The 1-in-20 obligation limits the scope for taking exit buy-back risk. The 1-in-20 obligation does not apply to entry and hence there is more scope to consider accepting buy-back risk compared to contractual solutions.

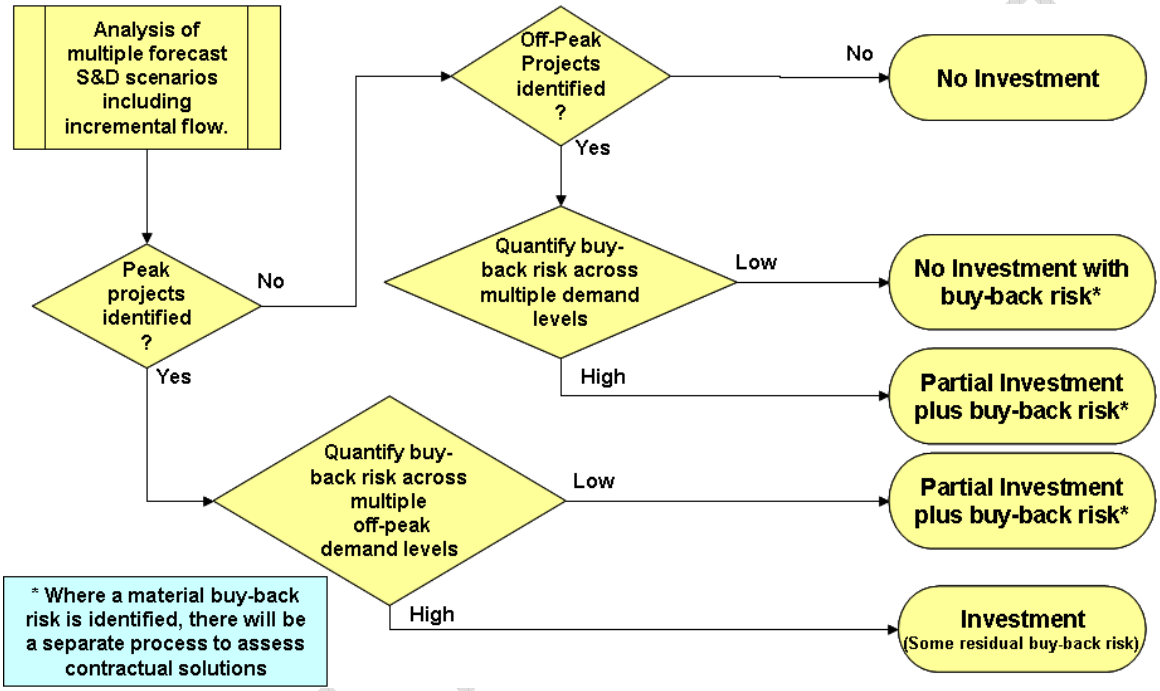
The following diagram outlines the high level process for considering investment versus contractual solutions in relation to exit capacity.



Entry capacity

The main driver for entry capacity investment is analysis at high demand levels based on forecast supply scenarios. Further analysis for off-peak demand and supply sensitivity scenarios is carried out, and investment may be identified as being required under either of these conditions. Where investment has been identified, the potential for contractual solutions will be identified.

The following diagram outlines the high level process for considering investment versus contractual solutions in relation to entry capacity. There will be some residual buy-back risk associated with all of these options.



APPENDIX B – DETERMINING ANALYSIS SCENARIOS

Determining the Demand Scenarios for Analysis

An appropriate demand scenario for the Incremental Capacity Type and Type of NTS System Point being considered will be selected as per the tables below. For incremental Exit Capacity the relevant Exit point will be modelled at the obligated plus incremental capacity level:

Table 1

<table>
<tr><th>Incremental Capacity Type</th><th>Type of NTS System Point</th><th>Demand Conditions</th></tr>
<tr><td>Incremental Entry Capacity</td><td>All Aggregated System Entry Points (ASEPs)</td><td>Forecast levels of demand capped at the obligated capacity level for Distribution Networks (DN), Directly Connected Loads (DC) and Interconnector Exit Points for the day from National Grid's Average Load Duration Curve (Diversified) which equates to the most onerous demand condition, limited by the minimum demand level at which the relevant ASEP is forecast to operate at the incremental capacity level. For entry analysis, dependant on location, the most onerous design condition may be at peak demand if influenced by peak exit point pressures or may be at lower demand when gas is transported over longer distances.

NTS Flex Capacity / DN Diurnal Storage utilisation consistent with the relevant demand level

Power Station within-day profiling based upon operational experience</td></tr>
<tr><td rowspan="4">Incremental Exit Capacity</td><td>Distribution Network / Directly Connected Load (e.g. power station / industrial facility)</td><td rowspan="2">Obligated Exit Capacity within the exit zone where the incremental capacity is required (see Table 5), otherwise combinations of Sold and forecast demands capped at the obligated capacity level depending on type and location of the incremental signal;
(1) Sold Exit Capacity levels at all DN Exit Points
(2) Maximum forecast demand levels at all DC Exit Points including NTS Storage Sites and Interconnectors capped at the obligated capacity levels

NTS Flex Capacity / DN Diurnal Storage utilisation consistent with this demand level

Power Station within-day profiling based upon operational experience</td></tr>
<tr><td>Interconnector with uni-directional physical flow (e.g. Moffat)</td></tr>
<tr><td>NTS Storage Site</td><td rowspan="2">Obligated Exit Capacity within the exit zone where the incremental capacity is required (see Table 5), otherwise;
(1) Forecast levels of demand capped at the obligated capacity level for DN Exit Points (across entire NTS) for an appropriate day (or days) of National Grid's Average Load Duration Curve (Diversified).
(2) Forecast levels of demand capped at the obligated capacity level for all DC Exit Points, including NTS Storage Sites and Interconnectors, from an appropriate day (or days) of National Grid's Average Load Duration Curve (Diversified)

NTS Flex Capacity / DN Diurnal Storage utilisation consistent with this demand level

Power Station within-day profiling based upon operational experience</td></tr>
<tr><td>Interconnector with bi-directional physical flow (e.g. IUK)</td></tr>
</table>

Determining the Supply Scenario for Analysis

An appropriate supply pattern for the Incremental Capacity Type and Type of NTS System Point being considered will be selected as per the tables below. All forecast supplies will be capped at the obligated capacity level other than where incremental capacity has been signalled, which will be modelled at the obligated plus incremental capacity level:

Table 2

Incremental Capacity Type	Type of NTS System point	Supply Pattern
Incremental Entry Capacity	All Supply points	Supplies at all ASEPs in the entry zone (see **Table 3** below) of the incremental capacity ASEP, plus a single ASEP, deemed to be that of highest interaction with the incremental ASEP zone, as defined in **Table 4** below will be increased to the maximum forecast supply level A supply/demand balance (the demand level as determined from **Table 1** will be maintained by reducing supplies, as appropriate, at ASEPs of lowest interaction with the Incremental capacity ASEP, as also defined in **Table 4** below. The balancing ASEPs will be reduced to an appropriate minimum, subject to the forecast minimum supply level for the gas year and demand level being considered, until a supply and demand balance is created. If there is insufficient supply at all balancing ASEPs, then the ASEP of highest interaction with the incremental ASEP zone, which had previously been increased to maximum forecast supply, will be reduced until a supply and demand balance can be achieved. Profiled supplies will not be assumed.
Incremental Exit Capacity	All Exit points	ASEPs of highest interaction to the LDZ/Zone where the incremental capacity exit point is located, as defined in **Table 5**, will be reduced to an appropriate minimum level, as defined in **Table 3**. A supply/demand balance will be maintained by increasing supplies, as appropriate, at ASEPs of lowest interaction with the LDZ/Zone where the incremental capacity exit point is located, as defined in **Table 5**. Supplies at balancing ASEPs will not be increased beyond current obligated entry capacity levels. Profiled supplies will not be assumed.

Table 3

Entry Zone	ASEPs	Appropriate Minimum Supply Level (Mscm/d)
Easington Area	Easington	The lesser of; 1.) 5th Percentile of the range of historical supplies at the ASEP on days of aggregate national demand of 400mcm/d or above, from at least the last two complete gas years; and 2.) Forecast minimum supply level for the gas year and demand level being considered
	Hornsea	
	Garton / Aldbrough	
	Hatfield Moor	
	Burton Agnes (Caythorpe)	
South East	Bacton	
	Grain LNG	
	Tatsfield	
	Albury	
	Palmers Wood	
North West	Fleetwood	
	Partington	
	Burton Point	
	Hole House Farm	
	Cheshire	
Theddlethorpe Area	Theddlethorpe	
	Blyborough (Welton)	
Northern Triangle	Teesside	
	Barrow	
	St Fergus	
	Glenmavis	
	Canonbie	
West UK	Milford Haven	
	Dynevor Arms	
South West UK	Barton Stacey (Humbly Grove)	
	Avonmouth	
	Wytch Farm	
	Portland	

New ASEPs will be treated as being in one of the above Entry Zones based on the minimum pipeline distance to an existing ASEP.

Table 4

Zone of Incremental ASEP	ASEP of highest interaction with the incremental ASEP	ASEPs of lowest interaction with the incremental ASEP
Easington Area	Bacton	Determined by pipeline distance from the incremental ASEP, with the farthest considered first.
Theddlethorpe	Easington	
South East	Easington	
Northern Triangle	Easington	
North West	Milford Haven	
West UK	Bacton	
South West	Milford Haven	

Table 5

LDZ / Zone of the Incremental Exit Point	ASEPs of highest interaction with the LDZ / Zone of the Incremental Exit Point	ASEPs of Lowest interaction with the LDZ / Zone of the Incremental Exit Point
Scotland	St Fergus, Teesside, Barrow, Glenmavis, Canonbie	Determined by pipeline distance from the incremental exit point, with the farthest considered first.
Northern	Teesside, Barrow, Easington, Hornsea, Garton / Aldbrough, Hatfield Moor, Burton Agnes (Caythorpe)	
North East	Teesside, Easington, Hornsea, Garton / Aldbrough, Hatfield Moor, Burton Agnes (Caythorpe)	
North West & Wales North	Barrow, Fleetwood, Partington, Burton Point, Hole House Farm, Cheshire, Milford Haven	
West Midlands	Fleetwood, Partington, Burton Point, Hole House Farm, Cheshire, Milford Haven	
East Midlands	Easington, Hornsea Garton / Aldbrough, Hatfield Moor, Burton Agnes (Caythorpe), Theddlethorpe, Blyborough (Welton)	
East Anglia	Theddlethorpe, Bacton, Grain LNG, Tatsfield, Albury, Palmers Wood	
North Thames & South East	Bacton, Grain LNG, Tatsfield, Albury, Palmers Wood	
South	Milford Haven, Dynevor Arms, Barton Stacey (Humbly Grove), Avonmouth Wytch Farm, Portland, Grain LNG, Tatsfield, Albury, Palmers Wood	
South West & Wales South	Milford Haven, Dynevor Arms, Barton Stacey (Humbly Grove), Avonmouth Wytch Farm, Portland	

New ASEPs will be treated as being in one or more of the above Exit Zones based on the minimum pipeline distance to an existing ASEP.

APPENDIX C – EXAMPLES

The following table shows examples of how entry and exit scenarios for the purposes of generating Revenue Drivers would be developed and assessed. These examples are not based on actual or potential projects and are solely for the purposes of demonstrating the methodology:

Example	Entry	Exit
Location	Theddlethorpe ASEP	Burton Point
Gas Year Analysed	2020 (based on year of customer capacity requirement and lack of incremental signals in the vicinity in later years)	2020 (based on customer required connection date and lack of incremental signals in the vicinity in later years)
Capacity Required	220 GWh/day	65 GWh/day
Base Scenario	400 Mscm/d – this scenario was identified as this demand level can be met from non-storage supplies and hence represents the lowest demand level that the incremental supply might be required. The example is non-storage.	Peak day – this scenario was identified as exit capacity must be made available in accordance with the security standard and therefore under 1:20 peak day demand conditions.
Capacity Modelled in Affected Zone/ASEP	Theddlethorpe ASEP increased to the obligated level; 610.7 GWh/day; Incremental capacity added taking the capacity to 830.7 GWh/day. Easington ASEP identified as the ASEP of highest interaction with Theddlethorpe and hence increased to maximum forecast level	All DN and non-storage DC exit points in North-west and North Wales increased to obligated capacity levels. Burton Point, Barrow, Cheshire and Holehouse Farm ASEPs reduced to minimum forecast, Milford Haven reduced.
Balancing Adjustments Made	The following ASEPs were reduced to forecast minimum; St Fergus, Milford Haven, Burton Point, Barrow, IOG, Cheshire, Holehouse Farm, Teesside, and Bacton with Hornsea as the final balancing ASEP reduced until a supply/demand balance was achieved.	The following ASEPs were increased to forecast maximum; St Fergus, Teesside, Easington Area, Theddlethorpe, Bacton, IOG, with Milford Haven reduced last until a supply/demand balance was achieved.
Constraints Identified	Constraint identified between the entry point and the next downstream compressor station.	Constraint identified at Weston point due to higher flows and increased pressure losses in the NW.
Reinforcement Identified	Reinforcement required to allow flows to be achieved while maintaining entry pressure within the maximum operating pressure of the terminal and downstream pipeline.	Reinforcement required to allow flows to be achieved while maintaining extremity pressures.