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0.1	Consultation draft

nationalgrid

The Generic Entry and Exit Revenue Driver Methodology Statement

Effective from 1st April 2013

GENERIC REVENUE DRIVER METHODOLOGY STATEMENT

Document Revision History

Version/ Revision Number	Date of Issue	Notes
0.1	October 2012	Draft for consultation

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 incremental 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 RIIO revenue driver funded incremental obligated entry capacity and RIIO revenue driver funded incremental obligated exit capacity.

This document is one of a suite of documents that describe the release of incremental 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 April 2013.

This document has been published by National Grid in accordance with [Special Condition TBC] 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 capacity, primarily beyond investment lead times 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 incremental 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 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 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 Condition 4B.

8. For the avoidance of doubt, this Statement relates to the determination of Revenue Drivers for the release of incremental NTS 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 incremental capacity are set out in the Gas Act and the Licence.

10. Specific obligations in respect of the release of incremental capacity are set out in [Special Condition TBC] of the Licence.

11. Under [Special Condition TBC], National Grid must prepare and submit to the Authority for approval the Incremental Entry Capacity Release Methodology Statement (the "IECR") setting out the methodology by which National Grid will determine whether to make incremental entry capacity available for sale.

12. Under [Special Condition TBC], 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 how it will release NTS Exit Capacity.

13. The methodologies produced in accordance with paragraphs 10 and 11 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 TBC of the Licence. This condition requires the preparation of a statement setting out the methodology by which National Grid will determine Revenue Drivers. 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 incremental 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, National Grid has developed a generic multi-stage timeline, 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). 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	Up to 6 months
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 and/or commercial/contracting alternatives (as applicable) to support the delivery of incremental capacity as a consequence of the receipt of a formal capacity signal.

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

18. National Grid can only permanently increase the level of obligated 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.

19. Capacity substitution is the process of substituting Unsold Firm capacity from one or more system points to another system point where demand for capacity exceeds the available obligated capacity quantities for the relevant period.

20. Increased allowed revenue, through the application of the Revenue Driver, will be triggered when National Grid accepts an incremental capacity obligation which cannot be satisfied without investment i.e. substitution is not possible. Such an incremental capacity obligation 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 capacity levels that National Grid is obliged to provide; and

- National Grid has progressed through the planning submission development process to the appropriate point[4]; and

- a capacity bid/application that passes the relevant user commitment test, such that release of this capacity is viewed as economic, cannot be met, all or in part through capacity substitution.

21. Upon allocation of incremental capacity, following receipt of a valid incremental capacity signal, National Grid's totex allowance revenue will increase by the level determined by the Revenue Driver.

22. The Revenue Driver will be calculated from this Generic Revenue Driver Methodology as soon as sufficient data is available and no later than stage 2 of the planning process[5]. It will be based on an estimation of the cost of the pre-construction activities and the physical build required on the Network, including a 20% discount where National Grid identifies that it will be pursuing contractual solutions, to provide the required incremental capacity.

23. The Revenue Driver will be calculated 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 an agreed library of unit costs.

24. The Revenue Driver calculation will be informed by information gathered from the optioneering and enhanced consultation (required under the Planning Act) at the time the Revenue Driver is calculated.

[4] Either successful granting of a Development Consent Order (or equivalent local planning consent) in cases where a 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).
[5] 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.

25. 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.

26. The release of incremental 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)[6]
- Funding for National Grid to implement a contracting solution (where contracting is seen as a more economic option to construction)
- An adjustment to the SO Constraint Management Target to reflect the resulting net change in the level of capacity constraint risk on the Network[7]
- A combination of any or all of the above three options as appropriate

27. Whilst calculated during the planning process, the Revenue Driver would trigger an adjustment to the allowed revenue only upon allocation of the associated incremental capacity following receipt of a valid formal capacity signal from an NTS User.

28. When calculating a Revenue Driver, National Grid must take account of existing obligated levels of capacity at system entry/exit points which interact with the proposed incremental capacity system entry/exit point. Obligated levels of capacity are, in aggregate, far beyond current NTS capability, therefore, when calculating an appropriate Revenue Driver, National Grid will first need to assess the inherent level of capacity constraint risk on the Network i.e. the pre-existing difference between obligated levels of capacity and actual Network capability.

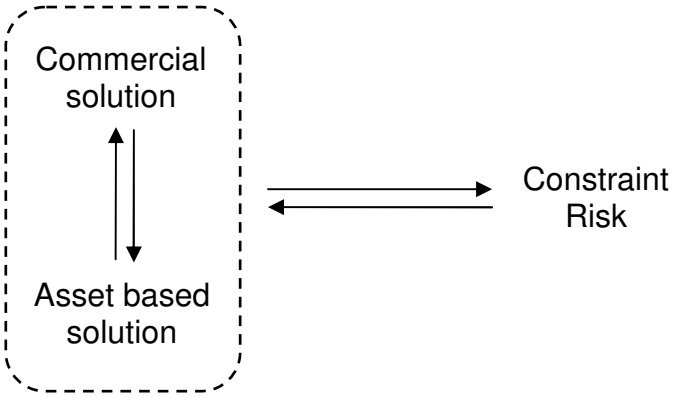
29. The Revenue Driver calculation will then take account of the investment, identified to increase system capability in order to accommodate the incremental capacity, and the resulting change in residual capacity constraint risk on the Network. This calculation will identify the investment cost against 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.

Methodology Objective

30. The primary purpose of this methodology statement is to determine Revenue Drivers in relation to incremental entry and exit capacity volumes.

31. When releasing incremental 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).

[6] Note, this is a single Revenue Driver allowance.
[7] Note that the resultant level of risk on the Network may increase or decrease hence the adjustment to the constraint management target may be positive or negative



32. Asset and commercial solutions both alter (directly or indirectly) system capability, and this adjustment needs to be considered against the change in capacity constraint risk[8]. For example, simplistically, where the capability provided by new assets is less than the amount of incremental capacity released, the overall capacity constraint risk on the system may reasonably be expected to increase; conversely where the added capability is greater than the amount of incremental capacity released, the overall capacity constraint risk may be expected to decrease.

33. The objective of this Generic Revenue Driver Methodology is to identify the investment cost associated with making available incremental capacity over and above the prevailing obligated 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 an incremental 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[9].

34. 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. The result of this optimisation may be:

- A requirement for investment to increase system capability; or
- Procurement of commercial services to redistribute system capability; or
- A change (increase or decrease) in the residual level of capacity constraint risk on the Network (increase of decrease) triggering a change (increase or decrease) in the SO constraint management target; or
- A combination of any of the above

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

[9] This was the approach taken by Ofgem during TPCR4 and was intended to provide an incentive to investigate potential scope for contracting solutions to the delivery of incremental capacity

35. 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[10].

- 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.

Revenue Driver Calculation Trigger

36. The determination of a Revenue Driver, in accordance with this Generic Revenue Driver Methodology will be triggered by;

- Signature of a Full Connection Application offer[11] in accordance with the UNC; and

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

37. 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 incremental capacity requested

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

- The forecast supply and demand scenario

- The unit costs

- The complexity of the build

[10] National Grid understands that the efficiency rate is proposed to be between 40% and 50%
[11] 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

Methodology Overview

38. 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 incremental capacity.

2) National Grid will cost up these projects using an agreed library of unit costs 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)

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

5) After calculating the Revenue Driver, National Grid will identify the change in residual capacity constraint risk, arising from the proposed investment/contract solution, and propose changes to the constraint target.

Worked example

39. *A signal for 100 units of incremental 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*

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

[12] Note that the relevant supply and demand scenario will be specific to the relevant entry/exit point.

[13] Excluding by substitution

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

- to be treated as either:
    - RIIO Revenue Driver funded incremental obligated entry capacity, or;
    - RIIO Revenue Driver funded incremental obligated exit capacity.
- And to include a variation to the constraint management target

CHAPTER 2: CALCULATION METHODOLOGY

Network Analysis Methodology

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

Network Model and Supply / Demand Forecast Assumptions

43. 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 incremental capacity will be required or a later year where in that year forecast capacity utilisation, including incremental 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 incremental capacity has been signalled.

44. 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.

45. National Grid's supply and demand forecasts for the relevant gas year will be used as a basis for the analysis. 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).

46. 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.

47. 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.

48. 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.

49. 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.

50. 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

51. 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.

Determining the Supply Scenario for Analysis

52. 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.

Reinforcement for Incremental Capacity

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

54. 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).

55. For Entry Capacity Revenue Driver Analysis, the reinforcement projects considered will be those required to increase system entry capability for ASEPs set at obligated Entry Capacity levels **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.

56. For Exit Capacity Revenue Driver Analysis, the reinforcement projects considered will be those required to increase system exit capability for Exit Points set at obligated Exit Capacity levels **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.

57. Only those reinforcement projects that directly affect the NTS' capability to accommodate the supply and demand conditions 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 these will be included in the Constraint Management Incentive.

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

Calculation of Revenue Driver

59. 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 a Unit Cost Library agreed at the start of the RIIO-T1 period.

60. 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 towards the end of stage 2 of the planning process before sufficient information is available to calculate the Revenue Driver.

61. 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
- The unit costs
- The complexity of the build

62. To apply unit costs to set the Revenue Driver it is necessary to take account of the key factors which drive costs in investment projects.

Pipelines

63. For pipeline construction, there are a number of major cost drivers over and above pipe diameter and overall length including:

- proportion of the pipeline length through hilly/urban terrain
- density of road/river/rail crossings (i.e. use of non open-cut pipe-laying techniques)
- proportion of the pipeline length requiring use of heavy-wall pipeline

64. National Grid will use an agreed methodology which scores the complexity of any given project against these factors and maps the total complexity score against a library of unit costs. This approach derives an appropriate unit cost for any project under consideration based on its expected complexity.

Construction through sensitive areas

65. Construction through sensitive areas (including National Parks, Areas of Outstanding Natural Beauty (AONB), Sites of Special Scientific interest (SSSI), and Archaeologically significant areas) introduces particular costs in addition to those a construction project through non-sensitive areas would normally face, such as:

- Requirement for material environmental protection measures
- Significant risk of exceptional protestor action
- Significant risk of co-ordinated landowner action

66. Planning consent conditions can also have a material impact on project costs, for example:

- Significant reinstatement (e.g. Replacement of large lengths of dry stone walls)
- Ten year environmental aftercare arrangements

67. National Grid's experience demonstrates that construction projects through sensitive areas (as defined above) attract additional requirements.

68. Options available to us to minimise the impact of construction in these areas include careful routing of the pipeline thus reducing consent conditions (for example use of a greater degree of non-open cut pipe-laying techniques or the need for extended environmental aftercare). As the Revenue Driver will be calculated during the pre-planning application process, National Grid will have information relating to the likely options available to us. If extended routing is the preferred option, this will be captured in the inputs to the Revenue Driver calculation (i.e. through a revised pipeline length). Conversely, if a more onerous route is favoured, this will require the application of an additional targeted complexity factor.

69. Construction in certain areas also attracts a heightened potential for increased compensation payments, as well as significant protestor action (which can introduce delay and security costs). At the time of calculation National Grid will be engaging with local communities and other stakeholders on potential route corridors, and should have a view (with supporting evidence) as to the likely level of enhanced costs which will apply. Given this information, National Grid will be able to estimate the cost impact of potential enhanced requirements and this will trigger an agreed adjustment to the calculated project cost which will be applied within the Revenue Driver calculation.

Other pipeline-related activity unit costs

70. There are a number of other construction activities which may be required in the provision of incremental capacity, these are listed below and are subject to separate unit costs in addition to the pipeline unit cost.

- High Flow Modifications (for example, the change-out of compressor station pipework and associated equipment to facilitate increased flow rates)
- 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)

Exceptional items

71. There is the potential for future projects to require exceptional items that are outside the scope of this complexity of approach (an example of such an item could be a requirement for a major tunnel for a significant river crossing or the requirement for a major Pressure Reduction Installation rather than a more typical AGI). The potential costs for such high impact, low probability requirements have not been included in the unit costing methodology. In the event such an item is required, National Grid will open discussions with Ofgem regarding funding arrangements.

Compression projects

72. 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), an agreed unit cost model, based on the required power and fuel type of the station, will be used.

73. 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.

General

74. 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.

75. 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) the appropriate SO constraint management target will be adjusted to reflect the changed level of capacity constraint risk on the Network.

76. 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.

77. 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 however the details of the project will be included in the reporting tables for completeness.

78. It is important to note that whilst National Grid may have previously received 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.

79. 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.

80. 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

81. 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 change (increase or decrease) in the residual level of capacity constraint risk on the Network triggering a change (increase or decrease) in the SO constraint management target

82. When assessing potential capacity related investments, National Grid will consider multiple supply and demand scenarios based on information within the Future Energy Scenarios[14], and considers combinations of various alternative investment and commercial/contractual solutions. Appendix A outlines the decision making process for considering investment versus contractual solutions.

Residual Network Capacity Constraint Risk

83. 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").

[14] 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/

84. 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.

85. 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).

86. 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.

87. 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.

88. 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.

89. 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).

90. 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.

91. 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.

92. 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 reflected in 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

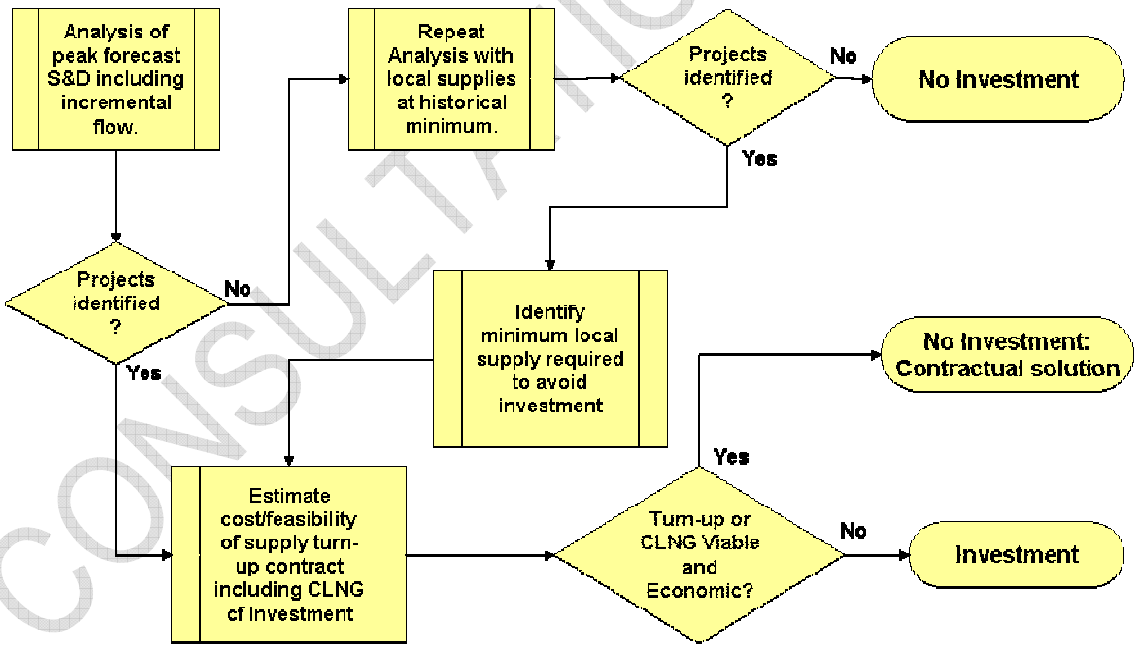
This appendix outlines the high level processes for considering the appropriate solution for the provision of incremental entry and exit capacity.

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.

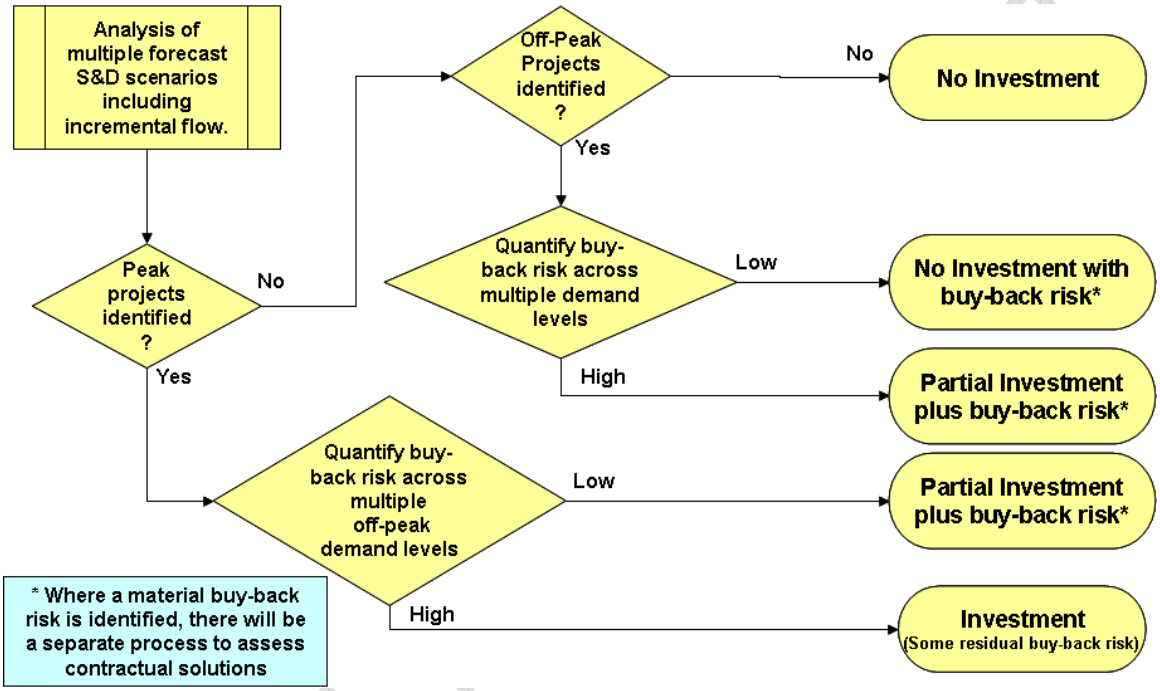
The following diagram outlines the high level process for considering investment versus contractual solutions in relation to exit capacity.



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:

Table 1

Incremental Capacity Type	Type of NTS System Point	Demand Conditions
Incremental Entry Capacity	All Aggregated System Entry Points (ASEPs)	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. NTS Flex Capacity / DN Diurnal Storage utilisation consistent with the relevant demand level Power Station within-day profiling based upon operational experience
Incremental Exit Capacity	Distribution Network / Directly Connected Load (e.g. power station / industrial facility)	Combinations of Sold and forecast demands capped at the obligated capacity level depending on type and location. (1) Sold Exit Capacity levels at all DN Exit Points (2) Peak day undiversified forecast demand levels at all DC Exit Points including NTS Storage Sites and Interconnectors NTS Flex Capacity / DN Diurnal Storage utilisation consistent with this demand level Power Station within-day profiling based upon operational experience
	Interconnector with uni-directional physical flow (e.g. Moffat)	
	NTS Storage Site	(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
	Interconnector with bi-directional physical flow (e.g. IUK)	

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:

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 its 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 (mcm/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	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	Bacton, Grain LNG, Tatsfield, Albury, Palmers Wood	
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	Milford Haven, Dynevor Arms, Barton Stacey (Humbly Grove), Avonmouth Wytch Farm, Portland	
Wales North	Barrow, Fleetwood, Partington, Burton Point, Hole House Farm, Cheshire, Milford Haven	
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.